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ERRATA.

Vol. 31, No. 3, p. 145, 2nd line of 3rd para., *for* " East and West Africa " *read* " French West and Equatorial Africa."

Vol. 31, No. 5, p. 334, 13th line from bottom, *for* monobular *read* monolobular (cirrhosis).

Vol. 31, No. 5, p. 359, LEFROU summary, line 3, *for* " whether " *read* " where."

Vol. 31, No. 7, p. 481, MASSIAS summary. In translation of title, *for* " or " *read* " and."

Vol. 31, No. 7, p. 514, GOEZ summary, lines 13 & 14, *for* " spirochaetosis icterohaemorrhagica does not exist in French West Africa " *read* " does exist."

Vol. 31, No. 12, p. 839, MATHIS summary. In translation of title, *for* Liver Virus *read* Living Virus.

Vol. 31, No. 12, p. 854, heading of summary, *for* BAGIOT (Ch.), *read* RAGIOT (Ch.).

Vol. 31, No. 12, p. 873, MONTEL summary. In translation of title, *for* " Case " *read* " Cure."

BUREAU OF HYGIENE AND TROPICAL DISEASES.

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LEPROSY.

CHINESE MEDICAL JOURNAL. 1933. Mar. Vol. 47. No. 3. **Leprosy Number.** pp. 223–330.

This special number is devoted to an account of the First National Conference on Leprosy of China held at Shanghai in October 1932 and attended by experts from a number of countries. The incidence of leprosy in China was dealt with by James L. MAXWELL, who frankly admitted that no one knows if they number half a million or five millions. The disease is mainly rural and patchy in its distribution, and the southern provinces are most affected. He suggests that if the staff of the hospitals would make notes of the places from which lepers came for treatment and map them out, much information could soon be accumulated regarding the incidence of leprosy. H. W. WADE contributed an interesting paper on the organization of leprosy research and he emphasized the need for a diagnostic serum test for early cases and for both clinical and bacteriological research. L. F. HEIMBURGER reported good results in treatment from combining gold preparations with hydnocarpus compounds. S. N. D. FRASER reported favourably on out-patient treatment by alepol followed by ethyl esters, especially iodized esters, intradermally and intramuscularly in cutaneous cases. Compulsory segregation in China only leads to hiding of cases. From Hangchow S. D. STURTON reports a rapidly increasing number of patients with a new spirit of hopefulness. The problems of segregation and the care of arrested cases is dealt with by C. M. HASSELMANN with experience in Central America and India and six years in the Philippines. In the latter the long coast line is most affected ; he places the numbers at between 14,000 and 70,000 among 12 million people, and at the end of 1931 about 6,984 were segregated. Only under the highly civilized conditions of Europe has segregation succeeded, as in Scandinavia. " In all other countries—the Philippines, Africa, the West Indies, Hawaii and even in Australia—compulsory segregation has not been an effective method of stamping out leprosy, and has not resulted in any material reduction in the number of annual admissions of new cases." In support of this statement a table is given of the number of cases segregated and the yearly new admissions from 1915 to 1931, and he adds that about 32 per cent. of the annual budget of the Philippine Health Service has been spent on leprosy and the Culion settlement ; he thinks that the control of this presumably contagious disease " lies

more on the lines of those principles and aims advocated by British leprologists in India," *i.e.*, by discovering and treating the early amenable cases and frequent examinations of all contacts, although obtaining adequate out-patient attendance is admitted to be a serious difficulty. For the arrested and bacteriologically negative cases he advises attractive settlements without too rigid rules.

A round-table conference was held on the present position and future prospects of leprosy work in China. It advised that all properly organized bodies interested in leprosy work be encouraged and Government control be limited to registration and inspection of leper establishments. The disease to be notifiable. Dispensaries, hospitals and homes for treatment to be provided with a central institution for research, and training physicians in the treatment, etc., in each seriously affected province, with periodic inspection of the families of lepers and the prohibition of certain trades. A second conference is to be held after two years. *L. Rogers.*

LEPROSY REVIEW. 1933. July. Vol. 4. No. 3. pp. 90–134. With 10 figs. Quarterly Publication of the British Empire Leprosy Relief Association, 29, Dorset Square, London, N.W.1.

Ridding Palestine of leprosy is dealt with by T. CANAAN, who estimates the number of lepers in Palestine at about eighty, with about 100 more in Trans-Jordan and Syria; only 21 are in the Jerusalem Moravian home. The disease shows very little infective power, although the people dread it and make lepers live at some distance from their houses. In such a small country with few lepers he thinks compulsory segregation is the best policy as regards all infective cases. There should be a two and a half to three years' period of negative bacteriological findings before discharge and frequent re-examinations. All relatives and near neighbours should be examined six monthly for two years to discover hidden and early cases, and all children born to lepers should be separated from their parents. The Leper Home is prepared to take 80 to 100 patients.

Non-specific serological tests in leprosy are discussed by A. MCKENZIE of East Africa, who concludes that the serum formalin reaction with the scale of Dye is of greater diagnostic value as regards the activity and progress of cases than the sedimentation index, since the latter is affected by all forms of debility.

The use of Brilliant green and Crystal violet in the treatment of leprosy is advocated by C. S. RYLES, who has used the method of G. A. Ryrie and thinks it is as good as hydnocarpus oil derivatives, safe, cheap and not unduly painful. [See RYRIE's paper below.] *L. R.*

LEPROSY IN INDIA. 1933. July. Vol. 5. No. 3. pp. 113–175. With 4 plates. Issued quarterly by the Indian Council of the British Empire Leprosy Relief Association.

This number opens with an account of a three days' Leprosy Conference held in Calcutta in March 1933, and convened by the Indian Council of the British Empire Leprosy Relief Association to discuss the methods of combating leprosy in India. The following conclusions were arrived at. Extension and co-ordination of anti-leprosy work as part of the Public Health System is required through the appointment of a specially trained leprosy officer for each province, with a Provincial

Leprosy Board containing representatives of missions, the leprosy association, etc., together with district leprosy boards to co-ordinate measures in each district. Training by a leprosy expert of the students in all medical schools and of sanitary inspectors to be provided, together with special leprosy clinics and others attached to each hospital, while infectious cases should be treated as far as possible in hospitals. Research, the examination of all children for early leprosy, and after-care farm colonies are also advised.

Extracts of replies regarding the intradermal treatment of leprosy show the oil to be less painful and much cheaper than the esters, and all the contributors favoured the use of this method as more rapid in its effects. *L. R.*

LOWE (John). **Epidemiology of Leprosy in Hyderabad (Deccan), India.** —*Internat. Jl. Leprosy.* Manila. 1933. Jan. Vol. 1. No. 1. pp. 17–30. With 1 fig.

A survey of about 122 villages revealed a leprosy rate of about 1 per cent., and Mohammedans showed a high rate, especially among the depressed classes. Males are affected twice as much at all ages as females. Careful inquiries into the histories of 400 cases indicated that the organism is inoculated into the skin or mucous membrane as the result of long and intimate contact with infected lepers, but conjugal infection is very rare, only one in the 400 cases. The joint family system, with several married sons and their families living with their father, favours its spread, for contact is not avoided until the disease is advanced. Of the 400 cases leprosy was contracted from the parent in 78, from brothers and sisters in only 28, but from other relatives living in the same house in 125. The time of onset showed the disease to have developed in 20 per cent. by the age of 10 years, in 40 by 15, in 60 by 20, in 80 by 25 and in 92 per cent. by 30 years of age, so that in most cases clinical signs appear before the age of twenty, and the disease is usually contracted in childhood. Adults are usually immune, but there may be occasionally a long latent period of years. This is all in accordance with former experience. *L. R.*

HOFFMANN (W. H.). **Leprosy and the Cultural Development of Africa.** —Reprinted from *Africa.* 1932. Vol. 5. No. 4. pp. 455–463.

This is a clear statement of the modern methods of prophylaxis against leprosy, designated "the curse of Africa," based on the fact that by the discovery and efficient treatment of the early stages the great majority can be cleared up and prevented from going on to the infective stage. The ancient system of universal compulsory segregation may now do more harm than good in causing the early cases to be hidden, for fear of life-long imprisonment, until it is too late for their effective treatment and until they have already infected members of their households and other contacts. We already know of 500,000 lepers in Africa, and the real numbers are not less than one or two millions, so in any case compulsory segregation would be impossible. Something is being done by voluntary isolation in leper villages and colonies, but what is most wanted is the creation of the necessary treatment centres all over the continent, and the author pays a

tribute to the work of the British Empire Leprosy Relief Association in "so actively fighting against leprosy with modern methods in all parts of the world" and on these lines in Africa. A Leprosy Research Institute for training experts is also needed. *L. R.*

BERNY. Création et organisation d'un village de lépreux au Moyen-Congo. [**A Leper Village in Moyen Congo.**]—*Ann. de Méd. et de Pharm. Colon.* 1933. Jan.–Feb.–Mar. Vol. 31. No. 1. pp. 68–77.

This is an interesting account of a prophylactic measure in French Congo territory where any attempt at compulsion fails completely through wholesale hiding of the lepers. The author wisely waited until he had gained the confidence of the indigenous inhabitants, opened a dispensary for voluntary out-patient treatment of lepers, and then organized a village for the residence of lepers and their families, away from other villages but easily reached by motor road and got the administration to exempt the occupants from taxes while land was provided for growing their food; a leper chief was appointed under whom they live just as they would in the native villages. The necessity for prolonged treatment is explained with the hope of eventual return home if they recover. The unmarried of the two sexes are separated and all children born to the married are isolated from the first. After a year a second village was required within reach of treatment of those of a different tribe. Thus isolation and treatment of a number of lepers has been obtained without compulsion. *L. R.*

JOSEPH (M. Gaston). La lutte contre la lèpre en Afrique Occidentale Française. [**Antileprosy Measures in French West Africa.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. Apr. Vol. 25. No. 4. pp. 602–603.

This brief paper describes how in French West Africa the old cruel and useless method of reliance solely on compulsory segregation of lepers is being replaced by surveys and examinations to ascertain the number and infectivity of the patients. Uninfective cases are treated by weekly visits to dispensaries without isolation, and infective ones at special hospitals and colonies, with dispensary treatment for those who become uninfective, and village sanatoria and a central leprosy institute for the others. Research is provided for under a specialist, and a crèche is provided for the reception of the infants of infective mothers during the treatment of the latter. *L. R.*

VINUESA (Angel). La lepra en la provincia de Tarragona. [**Leprosy in Tarragona Province.**]—*Rev. San. e Hig. Pública.* 1933. Mar. Vol. 8. No. 3. pp. 251–257.

The author states that the leper census reports 48 cases in the Province of Tarragona, Spain, but since these have advanced lesions, the number is probably greater, "at least double." Thirty-two were in the district of Tortosa, 15 in the close neighbourhood, the origin of the other was not known. Twenty-eight were males, 20 females. The population of the Province is 350,668, of whom 100,398 are in Tortosa district. It would appear that Tortosa is the endemic focus, sporadic cases only being encountered in other parts of the Province.

H. H. S.

LAMPÉ (P. H. J.). **Fate of Children Born of Leprous Parents in the Groot-Chatillon Leprosy Asylum.**—*Internat. Jl. Leprosy.* Manila. 1933. Jan. Vol. 1. No. 1. pp. 5–15. With 1 fig.

In the Groot-Chatillon Government leprosy asylum of Dutch Guiana married lepers may live together and any children are removed from their parents at 6 to 9 months of age. To 29 women at present in the asylum between the ages of 15 and 40, who have lived a total number of 267 years in the asylum, 71 children have been born and the coefficient of fertility of the isolated native women is 7·8 against 6·3 among non-leprous women of Surinam, so the lepers are fully fertile. The fate of 99 out of 105 children of leprous women in 32 years has been studied; 65 are alive and 34 have died. None of those dying under 3 years showed leprosy and only 2 of 6 older children dying developed it. The mortality among the children of mothers giving positive Wassermann reactions was much higher than the negative ones, possibly due to syphilitic and yaws infections. Of a total of 69 traced children who survived the first year 18 or 26 per cent. developed leprosy, and the disease appeared between the 4th and 8th years in 23·3 of the 26 per cent. There are indications that at least 60 per cent. of the children who contracted the disease were infected or reinfected at a later age after leaving the asylum. The incubation period of those considered to have been infected in the asylum was about two years. The conclusion is come to that the children of lepers should be separated from their parents directly after birth and they should not be brought up by members of the families of patients, but should be looked after by Government. Those who contract leprosy at an early age are very expensive cases for Government to segregate, perhaps for life, for there are Surinam lepers of over 80 years of age who were born in asylums and spent their whole lives there. *L.R.*

CHIYUTO (Sulpicio). **Early Leprotic Changes in Children and their Bearing on the Transmission and Evolution of the Disease.**—*Monthly Bull. Bureau of Health.* Manila. 1933. Jan. Vol. 13. No. 1. pp. 5–48. With 8 figs. on 4 plates. [23 refs.]

This is an interesting and detailed study of clinical and pathological conditions of the skin of forty children whose parents were lepers, with whom they had lived a year or two before being separated from them. The lesions met with included multiple depigmented areas or macules which appeared simultaneously in different sites of the skin that had been in intimate (skin to skin) contact with their leprous parents during infancy. Minute pinkish papulo-vesicular eruptions in groups and rather goose-flesh in aspect, were also common, together with flushing, glistening and tense condition of the skin of the legs. Perivascular round-celled infiltration was found microscopically in these lesions, while more developed macular lesions showed the changes of tuberculoid leprosy with giant celled formation, but typical *Mycobacterium leprae* were not demonstrated in the lesions except in one case. These observations are held to contradict the single point of entry of infection in favour of multiple skin infection through contact with infected mothers during infancy, and the lesions appear to be progressing; this suggests a granule stage of the bacillus as their cause, and the author agrees with RODRIGUEZ that drug treatment does not prevent these early developments of leprosy in young children. *L. R.*

SEELEY (S. F.). **A Trip to Culion Leper Colony.**—*Milit. Surgeon.* 1932. June. Vol. 70. No. 6. pp. 597–606. With 13 figs.

This naval medical officer described what he was shown of leprosy during a short trip to this much-reported-on leper settlement. The most interesting statement in the article is that "The number of patients developing advanced leprosy is becoming less each year under the intensive treatment with Chaulmoogra ester." *L. R.*

TISSEUIL (J.). Le problème de la lèpre en 1932. [**The Leprosy Problem in 1932.**]—*Ann. de Méd. et de Pharm. Colon.* 1933. Jan.–Feb.–Mar. Vol. 31. No. 1. pp. 63–67.

This is a brief summary of work on leprosy published last year. The author points out that the examination of recruits shows that the disease has not decreased in Japan and that in Dutch Guiana compulsory segregation has been given up. *L. R.*

URUEÑA (Jesus Gonzalez). **Leprosy Proteus.**—*Arch. Dermat. & Syph.* 1933. Mar. Vol. 27. No. 3. pp. 450–459. With 11 figs.

The author describes and illustrates some of the less typical clinical forms of leprosy. These include vitiligoid, psoriasisform, ichthyosiform, hybrid leprous and congenital ichthyosis, syphiloid lepromatous alopecia and neurodermitic lichenoid leprid varieties. *L. R.*

MARKIANOS (J.). La bacillémie et la fièvre lépreuse. [**Bacillaemia and Leprous Fever.**]—*Ann. Dermat. et Syph.* 1933. Mar. 7th Ser. Vol. 4. No. 3. pp. 220–229. With 4 figs.

This is a good account of the well known febrile reactions of leprosy with some temperature charts. In the nodular cases Hansen's bacillus can be found in the blood by examining thick drops stained as for Koch's tubercle bacillus during the febrile stage, and they are also not rarely found in mixed cases, but not in nerve cases. Treatment is symptomatic and aspirin, quinine, antipyrine, caffeine, diuretics and tonics are recommended. *L. R.*

COTTINI (Gian Battista). Contributo allo studio di tre casi di lepra con particolare riguardo alla bacillemia. [**Bacillaemia in Leprosy.**]—*Giorn. Ital. di Dermat. e Sifil.* 1933. Feb. 68th Year. Vol. 74. No. 1. pp. 84–113. With 6 coloured figs. on 1 folding plate. [33 refs.]

This long and very detailed paper may be summarized by saying that the author examined the blood, 10 cc. taken by venepuncture, from three patients with leprosy, one showing an eruption resembling erythema nodosum, the other two with leproma nodules. The blood was treated as follows :—

To the 10 cc. were added 5 cc. of 3 per cent. acetic acid and the mixture cautiously shaken, avoiding frothing, after which it was set aside for 30 minutes, then centrifuged for 30 minutes at 3,000 r.p.m. The deposit was mixed with 15 cc. of 35 per cent. antiformin and shaken well to render it homogeneous; 15 cc. alcohol was next added and the whole again centrifuged for half an hour; the residue after being washed with distilled water and a final centrifuging was spread on a slide and stained by the Ziehl-Neelsen method.

Positive results were obtained on certain occasions when the blood was withdrawn during a bout of fever, but once only during apyrexia. Examination of the cerebrospinal fluid and urine was negative, as were also the results of all attempts at culture and animal inoculation. Appended to the article is a plate with six excellent illustrations.

H. H. S.

i. GIRARD (G.) & WOLTZ (H.). La cholestérolémie chez les lépreux de Madagascar. [**Cholesteraemia in Lepers of Madagascar.**]—*Bull. Soc. Path. Exot.* 1933. May 10. Vol. 26. No. 5. pp. 702–704.

ii. ——. A propos de la cholestérolémie chez les lépreux.—*Ibid.* June 14. Vol. 26. No. 6. p. 769.

i. Estimations of cholesterin in 100 native lepers showed the normal mean figure for the same race of 1·10 gm. in nerve leprosy, but the low mean figure of 0·95 in nodular and mixed cases.

ii. In this note attention is drawn to a former paper of A. MARRAS showing similar results to theirs in Madagascar. They also state that the cholesterin in the serum of lepers can be increased by prolonged treatment with chlorhydrate of choline. *L. R.*

KUPFFER (A.). 32 Jahre Lepratherapie. [**Thirty-Two Years of Leprosy Treatment.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Aug. Vol. 37. No. 8. pp. 373–380.

This is an historical account of the various treatments used by the author in the past thirty years at the Juda leprosarium in Estonia. They include chaulmoogra oil and Unna's sodium and magnesium gynocardate pills orally, nastin, the injection of the oil and antileprol and gold preparations such as krysolgan, as well as iodides orally and icthyol as a local preparation and carbon dioxide snow. No data of the results obtained with the different preparations are given, but the general conclusion is come to that in the first stages of the disease the prognosis under present treatment is distinctly more favourable than in more advanced cases. *L. R.*

TOMB (J. Walker). **Chaulmoogra Oil and its Derivatives in the Treatment of Leprosy.**—*Jl. Trop. Med. & Hyg.* 1933. June 15, July 1 & 15. Vol. 36. Nos. 12, 13 & 14. pp. 170–178; 186–189; 201–207.

This is a lengthy summary of the literature on the subject with useful references. *L. R.*

FERRÉ. Préparation anti-lépreuse à partir d'huiles de caloncobas du Cameroun. [**An Anti-leprous Preparation from Oil of Caloncoba in Cameroon.**]—*Ann. de Méd. de et Pharm. Colon.* 1933. Jan.–Feb.–Mar. Vol. 31. No. 1. pp. 78–83.

This is a short paper on preparations from a local chaulmoogra-containing oil in West Africa. *L. R.*

RYRIE (Gordon A.). **A Preliminary Report on the Action of Certain Dyes in Leprosy.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. June 29. Vol. 27. No. 1. pp. 85–92.

This is an interesting and promising report on the trial of a number of solutions of dyes intravenously in 85 cases of leprosy at the Federal Leper Settlement, Federated Malay States. Trypan blue, brilliant green, fluorescein and eosin out of fourteen preparations tried produced clinical improvement, often after a single injection although previous and subsequent ones had no effect ; their action is therefore irregular, but the results compare favourably with those obtained with chaulmoogra preparations and without much reaction. Selective staining with relative concentration in the leprotic lesions was observed. Strong sterile filtered solutions were used, such as 15 to 20 cc. of a 1 per cent. solution of brilliant green, 25 to 75 cc. of a 4 per cent. one of trypan blue, 8 cc. of a 2 per cent. solution of fluorescein, which may be combined with brilliant green, and 25 cc. of a 2 per cent. eosin. The later effects of this line of treatment are not yet known but further trials are indicated. *L. R.*

SOUCHARD & ROTON. Observation d'un cas de lèpre traité par le savon-total de Krebao. [**A Case of Leprosy treated with Krebao Soap.**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 769–772.

The authors report on the use of a soap made from the oil of Krebao (*Hydnocarpus anthelmintica*) prepared in the Saigon Pasteur Institute. The results surpassed their hopes, but did not amount to a complete cure ; they exceeded, however, anything due to spontaneous retrogression. The drug is also absorbed without trouble when given orally, and this is of great practical importance in Indochina, where the inhabitants prefer oral to other forms of treatment. *L. R.*

RODRIGUES (Sebastian L.). **Treatment of Leprosy and Other Bacterial Infections by Neoquinine.**—*Calcutta Med. Jl.* 1933. Mar. Vol. 27. No. 9. pp. 319–328. With 7 figs. on 4 plates.

Neoquinine made in Calcutta is stated to be the "soluble monophenyl-sulphonate of quinine" and it is claimed to be a powerful bacteriostatic in certain bacterial diseases, including leprosy, of which "seven cases have been treated on these lines with remarkable success." *L. R.*

LOËWENSTEIN (E.). **Bacteriological Diagnosis of Leprosy by Means of Blood Culture.**—*Internat. Jl. Leprosy.* Manila. 1933. Jan. Vol. 1. No. 1. pp. 39–44.

The author first refers to his work on cultivating the tubercle bacillus from the blood in lupus erythematosus, with 100 per cent. positive after four examinations, and in other conditions and he refers to the frequent complication of leprosy with tubercular infections. For cultures from the blood of lepers he employs a special asparagin solution with milk, egg, etc., the asparagin replacing peptone as the source of nitrogen. This is inoculated with sediment of sterile blood after centrifuging, removing the serum and dissolving the red corpuscles with sterile distilled water. This sediment can safely be subjected to concentrations of sulphuric acid not greater than 5 per cent., and cultures are still obtained. *L. R.*

DENNEY (O. E.) & EDDY (Bernice E.). **Leprosy : Comments on in vitro Behavior of Lepra and Certain Other Acid-Fast Micro-Organisms in Presence of Leukocytes.**—*Arch. Dermat. & Syph.* 1933. May. Vol. 27. No. 5. pp. 794–804. With 6 figs.

Denney reports that for more than fifteen years he has attempted to cultivate acid-fast organisms from lepers by incubating leprous pus cells or leprous material with nonleprous rabbit's leucocytes in normal saline or Tyrode's solution. More than fifty acid-fast bacilli from various sources have been used in the experiments, and he has obtained phagocytes distended with the bacilli which appeared to be multiplying in them in some cases. Those of rat leprosy showed considerable chemotactic affinity for the leucocytes, and after twenty-four hours showed both extracellular clumps and intracellular inclusions distending and distorting the cell wall and presenting the pictures of the "lepra cell" or the "signet ring" of Hansen and indistinguishable from globi. Altogether eleven of the strains tested were distinctly attracted to the leucocytes. Acid-fast bacilli contained in leper juice, however, did not show proliferation of acid-fast bacilli or globi when suspended with living leucocytes, but those from leprous abscesses did show increase in the number and size of the globi with proliferation on the addition of living leucocytes. *L. R.*

SUCH SANCHIZ (Manuel). Intentos de cultivo del B. de Hansen. [**Cultivation of** *Mycobacterium leprae.*]—10 pp. With 8 plates (6 coloured). 1933. Madrid. Comisión Permanente de Investigaciones Sanitarias, Dirección General de Sanidad.

The author gives an account of his cultures of four strains of *Myco. leprae* isolated, one from nasal mucus and three from lepromata. The medium he uses is composed of whole egg, placental broth (human and bovine) and orange juice in equal parts, of pH 7–7·2, heated to 75–80°C. for a quarter of an hour on three successive days. At the beginning a growth was visible in 8 days, but later in 48 hours. The organism is rod-like and resists 3 per cent. acid alcohol for 2 hours. It is Gram-positive, sometimes granular, sometimes homogeneous. With the Ziehl-Neelsen stain most of the bacilli show these granules, with Gram many are granular throughout.

He carried out inoculations into laboratory animals, guineapigs, rabbits, white rats and monkeys, intraperitoneally and into the anterior chamber of the eye. The cultures proved non-pathogenic. The author regards such animals as died as not being killed by the organism. He tested also for allergy; an emulsion of the organism injected intradermically into lepers and "all but three showed a nodular reaction persisting to the tenth day" [but the number of subjects is not stated]. Fixation of complement gave unreliable results, since several of the leprous sera fixed also with an antigen of *Myco. tuberculosis.*

H. H. S.

SCHLOSSMANN (K.). Die Kultivierung des Lepraerregers. II. Mitteilung. [**Cultivation of the Leprosy Bacillus.**]—*Zent. f. Bakt.* I. Abt. Orig. 1933. May 22. Vol. 128. No. 5/6. pp. 369–381. With 2 figs. [13 refs.]

The author reports further on his researches on the cultivation of the lepra bacillus in the Martin bouillon medium with a view to obtaining

sub-cultures, which has always presented great difficulties. He reports and illustrates six months cultures of the first generation and two months culture of the second generation on agar medium, and he finds that the leprosy bacilli multiply relatively well as long as the smallest suspicion of human material is present; the first cultures were obtained by transplanting pieces of human leprosy-bacilli-containing tissues, from which the organisms grew out into the medium. *L. R.*

ARAUJO (H. C. de Souza). Essais de culture du *Mycobacterium leprae* (*Coccothrix leprae*, Lutz 1886) par la méthode de Sumiyoshi-Shiga. [**Attempts to cultivate** *Myco. leprae* **by Shiga's Method.**]—*Internat. Jl. Leprosy.* Manila. 1933. Jan. Vol. 1. No. 1. pp. 45–47.

This short paper reports the failure to cultivate the leprosy bacillus by the method of SHIGA, owing the author thinks to many of the bacilli in skin lesions being dead or to the injurious action on them of dilute sulphuric acid. The success of OTA in growing acid-fast bacilli from the blood of lepers indicates that LOEWENSTEIN's method is preferable to that of SHIGA. *L. R.*

REED (G. B.). **Dissociation of** *Mycobacterium leprae.*—*Jl. Bacteriology.* 1932. Nov. Vol. 24. No. 5. pp. 357–378. With 2 figs. & 1 plate. [12 refs.]

After reference to earlier work on the dissociation of the tubercle bacillus, the author records work on similar lines on fourteen stock laboratory cultures of "Mycobacterium leprae" supplied by the National and the American type culture collections, and including the organisms of Clegg, Kedrowsky-Kraus, Duval, etc. Cultures were made on Petroff's gentian violet-egg medium, which allowed the colonies to be differentiated into R colonies, growing most characteristically as "a cone with an irregularly circular outline and sides sloping abruptly to a peak" and an S type, growing "as a perfectly regular hemisphere with a smooth and waxy surface," while numerous intermediate forms were met with, which did not become fixed in their characters. The conversion of S into R types and *vice versa* is described and discussed, and the following are the author's conclusions.

"1. It has been shown that many cultures of *Mycob. leprae* contain two or more colony types. In a group of fourteen cultures, regarded as belonging to the species, part were found to contain only S colony types, part only R types and part, mixtures of the two together with intermediate forms.

"2. Both types have been shown to exhibit a considerable degree of stability on most solid media while both have dissociated in certain culture fluids.

"3. S to R dissociation has occurred quite regularly on a variety of fluid media.

"4. The R types under all conditions studied have appeared much more stable than the S, yet a sufficient number of instances have been recorded definitely to demonstrate R to S dissociation.

"5. The S and R types were also shown to be distinguishable on the basis of growth habit in fluid media and oxidation-reduction potential growth curves, by acid agglutination, by electrophoretic potential and isoelectric points of suspensions and by antigenic content.

"6. Antigenic analysis by quantitative complement fixation and agglutination-adsorption reactions have indicated that the S organisms possess a specific S antigenic substance which is lacking in the R organisms."

L. R.

MIYOSHI (Shukuji). **The Complement-Fixation Reaction of the Leprous Serum. (IInd Report.)**—*Japanese Jl. Dermat. & Syph.* 1933. June. Vol. 33. No. 6. [In Japanese pp. 964–981. [47 refs.] English summary pp. 106–109.]

The author reports on the complement-fixation reaction with the use of "ovolecithin" combined with the alcoholic extract of human nerve as antigen in 332 lepers with 53·6 per cent. positive and 46·4 per cent. negative. *L. R.*

KORNEL (G.). Vergleichende Komplementbindungsversuche mit Seren von Leprösen, Tuberkulösen und Luetikern. [**Comparative Complement Fixation Tests with Sera from Cases of Leprosy, Tuberculosis and Syphilis.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1933. Vol. 78. No. 3/4. pp. 207–216. [15 refs.] [Summary appears also in *Bulletin of Hygiene.*]

The author tested the sera of 14 cases of leprosy, 2 of suspected leprosy, 3 with no sign of leprosy but with leper relatives, 10 of tuberculosis and 10 of syphilis for complement-fixation with the Witebsky-Klingenstein-Kahn Tb. antigen, with extracts commonly employed in the Wassermann test and with an extract of leproma made by himself. The leproma antigen was made from fresh bits of leproma which were rubbed up to a pulp and mixed with equal parts of physiological saline and 4 per cent. NaOH. The mixture was allowed to stand for an hour at 37°C. and the deposit of this was then washed with distilled water, neutralized with 4 per cent. HCl and dried at 57°C. The dry powder was mixed with sulphuric ether (1 cc. to 0·01 gm. powder) in which it stood for 4 days after which the ether was poured off and the residue, after being dried, was extracted with 96 per cent. alcohol for 16 days at 37°C. The resulting extract was filtered and the filtrate used in the test in a dilution of 1 in 5. With one exception all the leprosy sera gave positive complement-fixation reactions with all the antigens but were doubtful or negative to the Sachs-Georgi test. One of the suspected leprosy cases was positive and the other doubtful with the Tb antigen. Both gave doubtful reactions with leproma antigen and were negative to the Wassermann test. Of the three symptomless relatives of lepers, one gave negative or doubtful reactions throughout, the other two were positive only with the leproma antigen. Of the 10 tuberculosis cases only one gave a positive reaction with leproma antigen while 6 were positive with Tb., and all were negative or doubtful with the Wassermann. Of the syphilis cases half were positive with the leproma antigen.

Thus as a means of distinguishing Tb. from leprosy the Tb. antigen failed while the leproma antigen was relatively successful as it gave only one definitely positive result with Tb. sera. For the exclusion of syphilis in cases of leprosy the Sachs-Georgi reaction appears to have been the most successful. The author hopes from the results with relatives of lepers with whom they had been in close contact that further work may show the leproma antigen to be a valuable means of detecting leprosy in leper contacts before clinical signs have appeared.

L. W. Harrison.

AMBROGIO (Agostino). Alcune osservazioni cliniche e sperimentali sui fenomeni allergici nell'infezione lebbrosa. [**Allergy in Leprosy.**]—*Pathologica.* 1933. July 15. Vol. 25. No. 501. pp. 514–531. With 2 coloured figs. on 1 plate. [96 refs.] English summary.

The author's observations were made on twelve lepers. For specific antigens he used a watery alcoholic extract of a leproma and an emulsion of the bacillary and protoplasmic substances resulting from trituration of a nodule. For non-specific antigens, tuberculin 25 per cent. and undiluted for the cutireaction, and 0·5 cc. of a 10 per cent. solution for intracutaneous use, and gonococcus vaccine from 100 to 1,000 millions per cc.

The cutireaction with 25 per cent. tuberculin was negative in all, with the undiluted product he observed an erythema in 3 of the 12, coming on in about 36 hours and passing off in 72. Controls were all negative. The intracutaneous injection brought a good and prompt response (within 24 hours) in 3 patients with the anaesthetic type, and in a fourth, with mixed leprosy, the reaction was slower to develop (48 hours). Those who reacted well to tuberculin gave a strong reaction also with gonococcus vaccine. [This would appear as if the reaction was one merely to foreign protein in the susceptible ; no statement is made as to whether there might be a latent gonococcal infection in any of these subjects.]

The specific antigens were applied by scarification and by intradermal injection. The alcoholic extract produced a slight erythema, disappearing in 36 hours, in one patient only, suffering from anaesthetic leprosy. The intradermal test with 0·05 cc. of a 1 per cent. dilution yielded a positive result in all, more marked in the anaesthetic or mixed forms, and varying from a local erythema with slight infiltration disappearing in 4–5 days, to a small red nodule with haemorrhage and a zone of erythema, paling in 48 hours but the nodule did not disappear for about a week. The article is well documented. *H. H. S.*

HAYASHI (Fumio). **Mitsuda's Skin Reaction in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1933. Jan. Vol. 1. No. 1. pp. 31–38. With 2 figs. & 2 plates.

In 1916 MITSUDA first reported that the intradermal injection of boiled emulsions of lepra-bacilli-containing-nodules produced positive reactions in neuro-macular, but negative ones in nodular leprosy. Similar tests on 192 cases are now reported with the use of fresh nodules boiled in normal salt solution for 30–50 minutes, ground in a mortar, 1 gram added to 20 cc. of the salt solution, filtered through gauze, heated to 60°C. for one hour and enough carbolic acid added to make a 0·5 per cent. concentration. One-tenth of a cc. is injected intracutaneously and the reaction looked for on the 8th, 16th and 24th days in the form of infiltrated areas from 0·3 up to over 1 centimetre in diameter and classed from + to +++ by their extent. Of 64 neuro-macular all but 2 were positive, while all but 11 of the 125 nodular ones were negative. Thus a positive reaction occurs only in normal people resistant to leprosy and in the partially resistant neuro-macular stage. It is also of some prognostic value, for a case of nerve leprosy with a negative reaction is likely to pass into the nodular type, and a positive reaction in a nodular case is a favourable

prognostic sign. Other acid-fast bacilli, such as Timothy hay, and those of Clegg, McCoy, Duval and Kedrowsky, have positive reactions with all types of leprosy, so they differ from that of human leprosy.

L. R.

GUILLINY (R.) & MONTASTRUC (E.). Etude sur la lèpre oculaire murine. [**Ocular Rat Leprosy.**]—*Bull. Soc. Path. Exot.* 1933. July 12. Vol. 26. No. 7. pp. 901–905.

In eight rats inoculated intraperitoneally with rat leprosy the eyes were examined microscopically and in one a slight infection of the ciliary body and in another of the conjunctiva was found. Rats were therefore inoculated into the anterior chamber of the eye with very small numbers of rat leprosy bacilli from infected glands, and subsequent microscopical examinations showed that the organisms became localized in the ciliary bodies in large cells within which they multiplied rapidly.

L. R.

BALIÑA (Pedro L.). Obstáculos que traban la implantación de la lucha antileprosa en nuestro pais.—*Prensa Méd. Argentina.* 1933. July 5. Vol. 20. No. 27. pp. 1453–1473. With 26 figs.

COLVIN (Clifford), PATON (J. T.) & DAWES (S. R.). Leproma of the Cornea.—*Med. Jl. Australia.* 1933. June 3. 20th Year. Vol. 1. No. 22. pp. 685–686.

DA JUSTA (Antonio Alfredo). A lepra no Estado do Ceará. (Notas e Informações.)—*Rev. Med.-Cirurg. do Brasil.* 1933. June. Vol. 41. No. 6. pp. 172–196.

KNAP (C. Reeling). De leproserie te Tobemba in Zuid-Palopo.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. July 4. Vol. 73. No. 14. pp. 866–870.

RABELLO (Eduardo). Segregação e isolamento na prophylaxia da lepra.—*Folha Med.* 1933. May 5. Vol. 14. No. 13. pp. 254–265. With 1 chart.

REKO (Victor A.). Volkstümliche Heilmittel bei Lepra in Mexiko.—*Tuberkulose.* 1932. Vol. 12. No. 1. pp. 15–18.

ROXBURGH (A. C.). Leprosy (Mixed Type).—*Proc. Roy. Soc. Med.* 1933. Aug. Vol. 26. No. 10. pp. 1302–1303 (Sect. of Dermat. pp. 62–63).

TROPICAL OPHTHALMOLOGY.

A Review of Recent Articles. XX.*

Trachoma.—Barral & Luc[1] usually treat their trachoma patients by placing them in a sufficiently favourable environment to enable them to resist secondary infections and by using instillations of zinc and copper sulphate. Copper sulphate stick is applied twice weekly. They remark, however, that their more severely affected patients are not always rendered fit for service, and they have consequently given a trial to Jacobson's method of injecting intramuscularly a solution of Ethyl Cinnamate in benzyl alcohol and olive oil. They speak very favourably of this treatment. Roques[2] advocates grattage with a lump of sugar. The rubbing is sufficient to cause free bleeding from the membrane, and the block of sugar is allowed to absorb the blood. Treatment is repeated every few days. Guy & Tran-van-Nguu[3] have tried applications of oil of chenopodium. The oil is rubbed into the trachomatous conjunctiva with a tampon of wool, and sufficient force is used to induce a flow of blood. Motais[4] has described some of his experiences in treating the disease in Cochin China. He adopts MacCallan's classification of trachoma with some modifications. It is interesting to observe that with increasing experience his methods of treatment have tended to become less radical. Thus he considers silver nitrate in a solution stronger than 1 per cent. to be dangerous, and he has abandoned the routine use of copper sulphate crystals and severe scarifications. Instead he has adopted scrubbings with a wool mop carrying a solution of copper sulphate one in twenty. For corneal complications he favours subconjunctival injections of 1–3,000 cyanide of mercury. He uses 1 cc. of the solution mixed with 4 per cent. novocaine. Cornet[5] has attempted a fresh classification of trachoma. The utility of such a classification is in inverse ratio to its length and complexity and this particular one occupies eight pages. Hae[6] slits the trachoma follicles with a Graefe knife and then, with wool mounted on a glass rod, rubs boracic acid powder into the membrane. The conjunctival sac is next washed out with cold water and an ointment of yellow oxide of mercury with ephedrine is applied. The treatment is said to be painless and the patient can resume work in a few minutes. Thygeson[7] has reported the successful inoculation

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* For the nineteenth of this series see Vol. 30, pp. 374–381.

[1] Barral (R. E. L.) & Luc (R. H. L.). Résultats obtenus par la méthode du docteur Jacobson dans le trachome.—*Arch. Méd. et Pharm. Milit.* 1933. Feb. Vol. 98. No. 2. pp. 164–169.

[2] Roques (Henry). Nouveau traitement mécanique du trachome.—*Gaz. hebd. Sci. Méd. de Bordeaux.* 1933. Jan. 22. Vol. 54. No. 4. pp. 58–59.

[3] Guy (R.) & Tran-Van-Nguu. Note sur un traitement du trachome par les brossages à l'huile de chenopodium.—*Bull. Soc. Méd.-Chirurg Indochine.* 1933. Mar.-Apr. Vol. 11. No. 2. pp. 115–117.

[4] Motais. Du traitement contre le trachome pratiqué actuellement à la clinique ophtalmologique de Cochinchine.—*Bull. Soc. Méd.-Chirurg Indochine.* 1933. Mar.-Apr. Vol. 11. No. 2. pp. 118–126. With 1 fig.

[5] Cornet (Emmanuel). Le trachome en clinique et sa classification nouvelle.—*Bull. Soc. Méd.-Chirurg. Indochine.* 1933. Mar.-Apr. Vol. 11. No. 2. pp. 165–178. [30 refs.]

[6] Hae (Lim Eng). Treatment of Trachoma in Private Practice.—*Malayan Med. Jl.* 1933. June. Vol. 8. No. 2. pp. 102–105. With 4 diagrams.

[7] Thygeson (Phillips). Inoculation of the Human Conjunctiva with Trachomatous Materials.—*Amer. Jl. Ophthalm.* 1933. May. Ser. 3. Vol. 16. No. 5. pp. 409–411.

of a man with trachomatous material. The subject had been inoculated with the *Bacterium granulosis* on several occasions without any result. Acute symptoms developed after six days; and in twenty-six days the other eye became affected. Some minute non-pathogenic bacteria were recovered from the eye. These resembled the *Bacterium granulosis*, but were probably saprophytes derived originally from the air.

In the Revue Internationale du Trachome for April 1933 (Tenth Year No. 2) Archimede BUSACCA[8] discussing 100 cases of trachoma claims that some form of pannus could be detected in 99 per cent. of the patients. He describes a non-vascularized stage of trachomatous keratitis and considers that this always precedes the formation of new vessels. He is of opinion that trachomatous nodules and Herbert's "fossettes" do not occur in the true cornea, but only in that portion of the membrane which is covered by an extension of the conjunctiva. M. ZACHERT[9] presents the problem of Poland in relation to the disease. The eastern boundaries of this nation are in contact with extremely trachomatous countries: Soviet Russia, Lithuania and Roumania. Poland therefore serves as a barrier preventing the spread of the disease to the countries of Western Europe, and, thanks to the excellence of her sanitary precautions, she has kept the incidence low within her own borders. E. DELANOË[10] defends the use of chaulmoogra oil in the treatment of trachoma against the statement of PAGÉS (referred to in this *Bulletin*, Vol. 30, No. 6, p. 374) that no specific action can be claimed for the drug. She quotes the observations of various surgeons in her support and seems to imply that the drug may not have been applied with sufficient energy in unsuccessful cases. Chaulmoogra oil undoubtedly has the advantage that it is less irritating to the conjunctiva than the caustic drugs so often used. J. JACOBSON[11] reports the findings of a commission appointed to test the value of his treatment of trachoma by the injection of benzyl–cinnamic ester. 357 trachoma patients were treated by intra-muscular injection of the drug, local applications, with the exception of atropine when necessary, being discontinued, and 175 of the patients showed marked improvement. An increased resilience of the upper tarsal plate was specially notable and corneal troubles were much ameliorated. The drug causes a healthy dilatation of the bloodvessels and leads temporarily to an increased flow of tears. E. JUNÈS[12] refers to his experience of the same treatment in Sfax. This has been most favourable. In the issue for July 1933 MORAX (pp. 113–129) pleads for the recognition

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[8] BUSACCA (Archimede). La frequenza delle complicazioni corneali nel tracoma dedotta dallo esame di cento casi.—*Rev. Internat. du Trachome.* 1933. Apr. Vol. 10. No. 2. pp. 57–81. English summary.

[9] ZACHERT (M.). Le problème du trachome en Pologne en comparaison avec les pays avoisinants.—*Rev. Internat. du Trachome.* 1933. Apr. Vol. 10. No. 2. pp. 82–86. With 1 fig.

[10] DELANOË (E.). A propos d'une enquête sur le traitement des trachomateux à toutes les périodes de l'évolution de leur maladie à l'aide de l'huile de chaulmoogra.—*Rev. Internat. du Trachome.* 1933. Apr. Vol. 10. No. 2. pp. 87–99.

[11] JACOBSON (J.). Résultats obtenus dans le traitement du trachome au cours de notre mission en Tunisie avec la solution d'éther benzylcinnamique, dite "solution de Jacobson." (25 décembre 1931–15 mai 1932).—*Rev. Internat. du Trachome.* 1933. Apr. Vol. 10. No. 2. pp. 100–107.

[12] JUNÈS (E.). A propos du traitement des lésions cornéennes du trachome par la solution de Jacobson.—*Rev. Internat. du Trachome.* 1933. Apr. Vol. 10. No. 2. pp. 107–109.

of the importance of cell inclusions in trachoma. Philippe THYGESON[13] reviews the work done with respect to the bacteriology of the disease and concludes that, though it may be tempting to regard trachoma as non-specific and merely the result of repeated infections by various different varieties of bacteria, yet a microbic cause is probable and this is likely to belong to the filterable virus group. Patrick DIXON[14] states that he has found more than 10 per cent. of the population of the Kasenga district in the Belgian Congo affected by trachoma. SEDAN[15] records his experience of Tricoire's reaction as an aid to diagnosis. About 77 per cent. of the trachoma patients whom he examined reacted, and he considers that further developments of the test may render it really valuable.

Xerophthalmia and *Keratomalacia* continue to attract increasing attention. This is very advantageous since the condition is not only responsible for much blindness and incapacity, but its occurrence also indicates a serious defect in the nutrition of the population of the districts in which it is encountered. GORDON[16] found 14 inmates of the Mathari Mental Hospital affected and had their skin lesions examined by Dr. J. H. SEQUEIRA and the bacteriological condition of their eyes by Dr. DE SMIDT. Small papules, bluntly conical in shape, were seen at the orifices of the hair-follicles ; and it is suggested that these resulted from an extraneous infection which was favoured by a lowered resistance of the skin due to vitamin deficiency. Diphtheroid bacilli were found in the conjunctival sac of every case ; but these gave a negative result on animal inoculation. All the patients improved under cod-liver oil treatment. A ration of spinach has now been included in the diet of the inmates and arrangements have been made for a full supply of sweet potatoes. OWEN[17] writes regarding the disease in the Kampala district. There xerophthalmia is practically confined to the inmates of prisons. The majority of the free population live on a diet which consists basically of plantains and sweet potatoes supplemented by various vegetables, fruits and nuts in small quantity. Eggs, meat, milk, butter and ghee are seldom, if ever, consumed. The jail diet consists of maize, dry beans, ground nuts, and a small amount of meat supplemented by a comparatively small quantity of sweet potatoes. The author states that if xerophthalmia occurs even mildly and infrequently in a prison all the inmates are on the border line and a damaged liver may be the factor which determines the occurrence of the disease. He suggests that a thorough knowledge of xerophthalmia is essential for any medical officer who is responsible for the

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[13] THYGESON (Philippe). L'étiologie microbiologique du trachome.—*Rev. Internat. du Trachome.* 1933. July. Vol. 10. No. 3. pp. 129–142.

[14] DIXON (Patrick K.). Un foyer du trachome jusqu'ici non-rapporté.—*Rev. Internat. du Trachome.* 1933. July. Vol. 10. No. 3. pp. 142–145. With 1 map in text.

[15] SEDAN (Jean). Résultats de cent cinquante intradermo-réactions de tricoire dans le trachome.—*Rev. Internat. du Trachome.* 1933. July. Vol. 10. No. 3. pp. 145–154.

[16] GORDON (H. L.). Xeropthalmia in Mathari Mental Hospital.—*East African Med. Jl.* 1933. June. Vol. 10. No. 3. pp. 85–90.

[17] OWEN (H. B.). Observations on Health in Relation to Diet in H.M. Central Prison, Uganda. The Ocular Manifestations of Vitamin A Deficiency.—*East African Med. Jl.* 1933. May. Vol. 10. No. 2. pp. 53–58.

health of a rationed community since vitamin A is also called anti-infective vitamin. CORNET[18] has had experience of the disease in Cochin-China and has described its clinical characteristics. He recognizes that the corneal changes in keratomalacia usually are first seen in the substantia propria—a point often insufficiently appreciated. He recommends the use of subconjunctival milk injections, instillations of olive oil, and suitable diet. [The value of any subconjunctival injection in this disease is very questionable. The essential principles of treatment are to treat any gastro-intestinal defect and at the same time to ensure the absorption of cod-liver oil. If this absorption takes place an associated improvement in the general condition will occur. Locally, all irritation of the corneal and conjunctival surfaces should be avoided, and the conjunctival sac should be kept clean and lubricated by the use of normal saline and liquid paraffin. Owing to its high lysozyme content, albumen water, made by dissolving the white of a fresh egg in normal saline, might prove useful.]

Superficial Punctate Keratitis.—Saradindu SANYAL[19] has described an epidemic of superficial keratitis which occurred in Calcutta during the monsoon. It differed in some respects from the epidemics observed in Madras and elsewhere. 175 cases were seen and a noteworthy feature was the way in which members of the same family and room mates of the same hostel tended to be attacked. Punctate and linear forms were met with and in some cases an annular band of fine opacities started at the periphery of the cornea and spread towards the centre. Some conjunctival reaction was noticed, but iritis did not occur. Recovery usually occurred within a week or ten days, but was sometimes delayed for about three weeks.

KIRWAN[20] considers that the incidence of *cataract* in diabetes is greater than in non-diabetics of the same age and that, as a result of diabetes, the cataractous lens changes appear at a relatively early age and tend to mature more rapidly. He reports four cases in which cataract occurred under the age of thirty in diabetics and was undoubtedly caused by the systemic disease. Three of these were operated upon successfully after the urine had been rendered sugar-free by treatment but the fourth died from acute miliary tuberculosis before operation. The blood sugar should be brought to normal or to near normal before operating on a diabetic for senile cataract, and it is advisable to wash out all cortical matter and then to perform a small button-hole iridectomy in such a case in order to lessen the risk of haemorrhage into the chamber and the formation of a dense after cataract.

HAE[21] has described a treatment for *couched lens* which has given him satisfaction. The pupil of the patient is fully dilated and he is then placed in the prone position until the lens nucleus falls into the anterior chamber. When it has reached this position the pupil is rapidly contracted by instilling amino-glaucosan in order to prevent

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[18] CORNET (Emmanuel). Le xérosis en clinique oculaire. Son nouveau traitement local (facteur A liposoluble).—*Bull. Soc. Méd.-Chirurg. Indochine.* 1933. Mar.–Apr. Vol. 11. No. 2. pp. 179–189. [42 refs.]

[19] SANYAL (Saradindu). Epidemic Superficial Keratitis.—*Amer. Jl. Ophthalm.* 1933. May. Ser. 3. Vol. 16. No. 5. pp. 390–393.

[20] KIRWAN (E. O'G.). Diabetic Cataract.—*Brit. Jl. Ophthalm.* 1933. June. Vol. 17. No. 6. pp. 346–351. With 3 figs.

[21] HAE (Lim Eng). Treatment of Couched Lens.—*Malayan Med. Jl.* 1933. June. Vol. 8. No. 2. pp. 105–108. With 3 figs.

any return to the vitreous and the lens is then extracted. The treatment should be undertaken before any severe iridocyclitis has set in. [The reviewer was accustomed to treat these cases by removing the lens with a spoon, and found it surprisingly easy to effect this without any loss of vitreous. The vitreous appeared to have acquired an increased consistency ; and the aqueous, too, seemed to have increased in volume. His results were sufficiently good to encourage him to continue this practice.]

The variations in intra-ocular pressure which occur amongst opium addicts has been investigated by Kanji KANDA and Kazen So[22]. Twenty-two persons were dealt with and the authors found their ocular tension to be either normal or somewhat higher than normal despite the contracted pupils displayed by the majority. The general condition of an addict is unstable and this is responsible for irregular variations in his intra-ocular pressure.

Beriberi.—AYUYAO[23] has met with a corneal lesion in recently confined women who are suffering from beriberi. The patients complained of blurred vision affecting both eyes but were free from pain or discomfort. The conjunctiva, anterior chamber, iris and lens appeared normal whilst the pupil reflexes were unaffected. The fundus reflex was uneven, and only a distorted image of the fundus could be obtained. The author states that he found amyloid changes in the corneal epithelium and that this was the cause of the symptoms. Slow recovery occurred as the general disease got better.

[24]The Annual Report of the Ophthalmic Section of the Egyptian Government for the year 1931 deals with the large number of 634,088 new admissions to the Eye Clinics of the country and thus furnishes very valuable statistics regarding the incidence of diseases of the eye. The acute ophthalmias constitute the chief cause of blindness (80 per cent.) and the gonococcus is the predominant infecting organism (45 per cent.). School Clinics are an important item in the activities of the department. Over 11,000 pupils were examined during the year and of these 96 per cent. were found to be suffering from trachoma. This very high rate of infection discovered is ascribed to the fact that a magnifier (? Zeiss loupe) was employed for the examination of the children and follicles were therefore detected which would have escaped observation by the naked eye. Over 73,000 operations for trichiasis, 2,600 for dacryocystitis (excision of sac), 1,600 for senile cataract, and 1,000 for glaucoma (trephining) were performed. The Report contains illustrations of the many hospitals and units of the department.

H. Kirkpatrick.

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[22] KANDA (Kanji) & So (Kazen). Clinical Observations on the Intra-ocular Tension of Opium Habitués in Formosa.—*Brit. Jl. Ophthalm.* 1933. June. Vol. 17. No. 6. pp. 354–360.

[23] AYUYAO (Conrado D.). Corneal Lesion in Beriberi.—*Jl. Philippine Islands Med. Assoc.* 1933. Mar. Vol. 13. No. 3. pp. 158–161.

[24] EGYPT : Ministry of the Interior. Department of Public Health. Ophthalmic Section. Nineteenth Annual Report for the Ophthalmic Section, 1931.—40 pp. With 39 figs. on 18 plates, 1 folding map & 1 folding chart. 1933. Cairo. [P.T. 10.]

BERIBERI AND EPIDEMIC DROPSY.

VAN VEEN (A. G.). De invloed van wasschen en stoomen op het B_1-vitaminegehalte van rijstsoorten van verschillenden slijpgraad. [**B_1-Vitamin Content remaining in Rice of Different Degrees of Polish after Washing and Steaming.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. July 18. Vol. 73. No. 15. pp. 945–957.

The degree to which rice has been polished is generally, but wrongly, regarded as the sole factor determining the onset of beriberi by avitaminosis. It is a misconception also to locate the vitamin in the cuticle, for it is contained in the layer below this and in the germ. The various tests applied to rice, the iodine test, the phosphorus pentoxide test, etc., are not wholly satisfactory. Feeding tests take too long. In the author's opinion the tests applied are often of little value because they take no account of the importance for vitamin content of the mode of preparation of the rice for food. Two main methods of preparation are in use, (1) washing and steaming, and (2) cooking with water and evaporating or straining; these, in their several variations, have been investigated as regards the vitamin left in the rice. Supposing that a man absorbs all the vitamin ingested, which is sometimes doubtful, that he eats 500 gm. rice per day and that 0·5 to 1 mgm. of crystalline B_1 vitamin (125 to 250 International Standard Units) is his daily requirement, we may determine from these data what is the effect of preparation on the anti-beriberi qualities of rice. Various types of rice were tested and especially in ascending degrees of "polish"—silver-cuticle rice, slightly polished and hand milled rice, and highly polished rice. In Java the washing process, which is vigorous, is short, about 10 minutes, until the wash-water is clear. The results obtained by the author for samples of slightly polished rice, subjected to the processes of no treatment, washing, steaming, washing and steaming, soaking and steaming, soaking, washing and steaming, boiling and evaporating, and long washing were respectively in international units, 250–400, 125–200, 250–400, 75–125, 200–250, 125–200, 250–400 and much less than 100. Thus washing in particular is to be avoided. A special recommendation is made of the procedure known as "Parboiling."

W. F. Harvey.

AALSMEER (W. C.) & BIE (Gan Sing). Rijst en beri-beri. De pitressinereactie. [**Rice and Beriberi. The Pitressin Reaction.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Mar. 28. Vol. 73. No. 7. pp. 408–419.

The great majority of beriberi patients with active disease react promptly to vitamin B in whatsoever form it is administered but there are some exceptions. The possibility of an unfavourable effect of one of the food components suggested itself as an explanation for these exceptions. A patient placed on a vitamin-rich diet may be, to all appearance, cured and yet the adrenalin test (this *Bulletin*, Vol. 29, p. 92), is just as positive (lowering of the minimal blood pressure) as it was originally. We know that beriberi can develop in spite of full vitamin dietary owing to selective or total disturbance of absorption and assimilation. Might it not be possible that the food itself contributed to the prevention of the action of the vitamin? That a toxic substance in the rice could be the cause of delay in cure was very improbable as the majority of patients treated were rapidly cured with exactly the

same diet. It was decided then to leave red rice out of the dietary and it is difficult to avoid the impression that the withdrawal of this rice was the cause of the satisfactory effect produced upon the symptoms. The adrenalin reaction became favourably influenced.

With resistant secondary cases of beriberi the possibility was considered whether the pitressin reaction would bring relief. Pitressin, however, which was introduced as a medicament in the treatment of beriberi because it appeared to cause immediate disappearance of the whole vascular syndrome, failed repeatedly to fulfil this expectation. This failure of the pitressin effect was directly correlated with the failure of dietetic cure. The relief of the right heart threw a correspondingly great burden on the left heart, to which it was not equal in those patients who had not yet recovered. One of the patients indeed, with " shoshin " died immediately after the pitressin injection. The failure to benefit from pitressin in cases of beriberi, where the adrenalin reaction still remains positive even though few symptoms of the disease may be present, can be taken as an indication that the disease is still active. *W. F. Harvey.*

MASSIAS (C.). Le traitement du béribéri par une préparation contenant vitamine B et acides aminés. [**Treatment of Beriberi by Vitamin B and Amino Acids.**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 789–792. [Refs. in footnotes.]

Working in Cochin China the author reports good results in beriberi from the use of a preparation containing brewer's yeast and amino acids.

The Annamites in Cochin China live almost exclusively on rice. fish and a fish sauce called Nuoc-mam. Beriberi is common. In 1930 the author began treatment of the disease with tablets (4 per day) containing brewer's yeast and amino acids. In January 1933 the same preparation was given in the form of a paste (a " cuiller à soupe " per day). The results have been very satisfactory. Within a few days acute cases with cardiac symptoms are relieved while oedema is improved in 2–4 weeks. In about 2 months the more chronic cases are able to walk normally. In 1930 there were 275 cases of beriberi with 25 deaths. Treatment was begun in 1931 and in that year there were 322 cases with 23 deaths. In 1932 out of 274 cases there were only 8 deaths. *A. D. Bigland.*

CALCUTTA MEDICAL JOURNAL. 1933. Feb. Vol. 27. No. 8. pp. 271–291. With 14 charts.—**Discussion on the Epidemiology and Public Health Aspects of Epidemic Dropsy.**

ROY (B. C.), NANDI (P.) & GHOSH (J. L.). **Report of Cases of Epidemic Dropsy treated in the Carmichael Medical College Hospitals (with a Note on Treatment).**—*Calcutta Med. Jl.* 1933. Feb. Vol. 27. No. 8. pp. 292–317.

The discussion was opened by Dr. T. N. MAZUMDAR. Epidemic dropsy first appeared in Calcutta in 1877 and two following years. With the exception of a small outbreak in 1901 no further cases were reported till 1907, when an epidemic occurred in which peripheral neuritis and oedema were the characteristic features ; 15 deaths out of 300 cases were recorded. In 1909 there were 433 deaths from the disease, the death rate being 0·5 per 1,000. Among the Hindus the fatal cases numbered 336, while among the Mahomedans there were only

77. The epidemic of 1919 occurred during the second half of the year ; 96 deaths were recorded, the death rate being three times greater among the Hindus as compared with the Mahomedans and four times greater in females. Further epidemics were noted in 1926 and 1927, the fatal cases numbering 939 and 630 in the respective years. In 1930 there were 68 deaths and in 1931, 52.

The onset of the disease is always during the rainy season and it seems that damp houses and a humid atmosphere may be important etiological factors. Heavy rainfall, however, is not always associated with epidemic dropsy outbreaks. Decomposition of rice due to humidity, pressure and poor ventilation with the consequent production of poisonous amines, is another possible factor. Atap rice is more liable to decomposition and has a much lower vitamin content than polished or siddha rice. Biochemical investigations of the blood show that uric acid is increased, calcium decreased, while other constituents are within normal limits. In the discussion which followed, the presence of peripheral neuritis in the 1907 epidemic was remarked, and mention was made of the fact that in other epidemics neuritis was absent.

(2) A report upon 22 cases of epidemic dropsy treated in the Carmichael Medical College Hospitals.

The staple diet of these cases was rice, but no evidence was found pointing to the harmfulness of any particular brand. Nineteen cases were in Hindus, while the sex incidence was 12 : 10 in favour of males. The age period 20–30 years showed the highest susceptibility. Examination of blood showed marked anaemia with leucocytosis, and uric acid was generally increased. Bacteriological investigations of urine and stools gave negative results but the gastric contents showed achlorhydria. Treatment consisted chiefly of diet adjustment, particularly as regards vitamins, and the exhibition of digitalis and strophanthin to patients showing cardiac involvement. Blood letting was very successful in severe cases. Three of the cases ended fatally.

A. D. B.

SARKAR (Sarasi Lal) & GUPTA (B. M.). **Rice Infection and Epidemic Dropsy.**—*Indian Med. Gaz.* 1933. June. Vol. 68. No. 6. pp. 324–325.

An account of a small outbreak of epidemic dropsy which was due to the eating of a particular sample of rice, the storage of which had been faulty.

The outbreak occurred in a single household at Raipur, a populous village in the district of Noakhali. A particular boat-load of rice arrived at the village and was sold to various people, none of whom developed the disease except members of the household of a certain Dr. Nath. In this family the rice had been stored in a dol besmeared with cow dung outside and kept in a damp room. After about 7 months (when the last portion of the rice at the bottom of the dol was being consumed) all the members of the household, including the doctor himself, developed epidemic dropsy and there was one death. It seems probable that a saprophytic organism in the rice had become pathogenic during long storage in the presence of damp. The same rice stored in earthen vessels previously soaked in mustard oil was harmless.

A. D. B.

PELLAGRA.

CHICK (Harriette). **Current Theories of the Aetiology of Pellagra.**—*Lancet.* 1933. Aug. 12. pp. 341–346. [47 refs.]

The main etiological possibilities of the nutritional aspect of pellagra are reviewed. The amino acid deficiency theory, the vitamin deficiency theory and the maize toxic theory are very fully discussed. Another possibility is presented, viz., " pellagra is caused by a toxic substance derived from the maize diet, which can be corrected by sufficient ' good ' protein, or perhaps by sufficient vitamin B_2 (which is found to accompany the ' good ' proteins)."

The new possibility of pellagra being a dietetic disease due to a positive toxic agent combined with vitamin deficiency has many analogies :—(1) EIJKMAN held that the substance in rice polishings which prevented and cured polyneuritis in birds acted as an antidote to the poison produced in the animal as the result of a polished rice diet. (2) MELLANBY has shown that " toxamins " from cereals having a harmful effect on bone calcification can be neutralized by vitamin D. Also a cereal-free diet is helpful in checking the spread of dental caries in children. (3) MELLANBY has also found that the toxic effect of ergot can be counteracted by substances such as butter and mammalian liver oil rich in vitamin A. Epidemic ergotism and lathyrism may have a similar etiology. (4) Boas FIXSEN has described skin lesions and loss of fur in young growing rats fed on diets in which dried egg white is the sole source of protein. This pathological condition can be prevented or cured by giving diets containing small amounts of yeast and liver.

This theory, too, explains why severe alcoholics in the U.S.A. are so liable to develop pellagra, since the whisky is made from maize products and the poor consumption of food which accompanies hard drinking will explain the inability of the patient to neutralize the poison. Alcoholic pellagra is rare in those European countries in which none of the strong liquors is derived from maize.

" The suggestion put forward that pellagra may be caused by a toxin derived from the diet, which can be corrected in the presence of certain foodstuffs (such as meat, milk, eggs, green vegetables) if given in sufficient quantity is, at present, a speculation." It is certainly a good working hypothesis. *A. D. Bigland.*

THAYSEN (Th. E. Hess). **Pellagra.**—*Hospitalstidende.* 1933. Mar. 30. Vol. 76. No. 13. pp. 325–348. With 25 figs. (21 on 11 plates). [28 refs.]

A detailed account of four cases of pellagra in Denmark is prefaced by a survey of the history and literature of this disease.

With regard to the diagnosis, it is admitted that the characteristic dermatitis may, according to certain authorities, be absent in otherwise typical cases. But Hess Thaysen advises his compatriots to regard pellagra dermatitis as an essential to the diagnosis of pellagra in Denmark. In all four cases there had been some previous illness, a psychosis in one case and some disease of the digestive tract in the other three. It was noteworthy in one case, that of a woman aged 48, that her diet had always been the mixed diet on which most Danes live, with this

exception that she had not taken milk. Cases such as this, and they seem not to be rare, would at first sight suggest that pellagra cannot be simply a vitamin-deficiency disease. But Hess Thaysen considers the conception of pellagra as a vitamin-deficiency disease is secure against the criticism which such cases evoke; and he puts forward various explanations for the development of pellagra in patients living on a so-called anti-pellagra diet. One explanation is that disease of the digestive tract may prevent the absorption of substances the lack of which is responsible for pellagra. Thus, in one of his patients, in whom violent diarrhoea was persistent, a dietary including plenty of meat, eggs, green vegetables, yeast and dried liver failed to have any effect on the pellagra as long as the diarrhoea lasted. When it ceased, and the same dietary was continued, the pellagra disappeared. Hess Thaysen advises his colleagues to be on the look out for pellagra, particularly among the insane and among patients with digestive disturbances and chronic infections. As for the insane who refuse to eat, the not uncommon practice of feeding them on such slops as oatmeal gruel which are deficient in vitamin B_2 may be asking for trouble. The dietary in such cases should contain vitamin B_2 in the form of milk and meat or yeast, as well as the other vitamins. *C. Lillingston.*

STOCKMAN (Ralph) & JOHNSTON (J. M.). **Cereal Food Poisoning and its Relation to the Etiology of Pellagra.**—*Jl. Hygiene.* 1933. Apr. Vol. 33. No. 2. pp. 204–223. With 18 figs. on 3 plates. [19 refs.]

"A maize diet can cause in monkeys characteristic nervous symptoms and death, and pathological changes in the nervous system identical with those found in pellagra." The harmful constituent of the grain is an acid which was isolated and given experimentally to various animals.

It was found that maize contains an acid which when administered by the stomach or hypodermically as a sodium salt produced in monkeys the same harmful effects as the maize itself. Rabbits and guineapigs are also susceptible. Similar results were obtained with other cereals (rice, rye, wheat and oats). There was no question of deficiency in vitamins as the animals received abundant vitamin-containing food. The effect is a direct toxic one, since the more cereal food or acid extractive given the severer are the symptoms. The poison probably injured the nervous and other systems both directly and by disturbing the calcium and alkali balance in the body. "Our monkeys and rabbits produced, probably as nearly as can be reproduced in animals, the symptoms and lesions of pellagra, and the pathological findings in the nervous system were identical with those described by numerous investigators as occurring in pellagra. The rabbits showed very marked skin lesions and thinning of bones." *A. D. B.*

SPIES (Tom D.) & DEWOLF (H. F.). **Observations on the Etiological Relationship of Severe Alcoholism to Pellagra.**—*Amer. Jl. Med. Sci.* 1933. Oct. Vol. 186. No. 4. pp. 521–525. With 1 fig. [10 refs.]

Over 90 per cent. of pellagrins investigated at Cleveland, Ohio, developed the disease after excessive drinking. These figures are probably representative of any northern city.

During the period March 1925–October 1931, 73 typical pellagrins were admitted to the Cleveland City Hospital or the Lakeside Hospital. Sixty-two of these 73 patients gave a history of severe alcoholism. That whisky itself is not a direct toxic agent is suggested by the fact that 10 pellagra cases recovered when given an adequate diet and yeast together with large quantities of corn whisky. It is probable that pellagra develops in alcoholic subjects because appetite is lost and drink is substituted for food. *A. D. B.*

WALKER (N. P.) & WHEELER (G. A.). **Influence on Epilepsy of a Diet Low in the Pellagra-Preventive Factor.**—*Public Health Rep.* 1931. Apr. 10. Vol. 46. No. 15. pp. 851–860. With 1 fig.

An account is given of a series of epileptic patients kept upon a ketogenic diet low in P.P. factor. The appearance of pellagra in these cases is associated with a diminution in the number of convulsive attacks.

The first group of cases comprised 10 white female epileptics in whom pellagra had never occurred previously. The basic diet used by GOLDBERGER and WHEELER for the study of the P.P. value of various foodstuffs was employed. The daily menu is reproduced. It is to be noted that this diet is not totally deficient in P.P. factor since cow-peas, tomato juice and yeast bread are present in small amounts. Within a few months after the commencement of this diet typical pellagra developed. In 7, stomatitis was the first symptom; bilateral symmetrical skin lesions were present in 9 of the 10 patients; some suffered from diarrhoea. It was observed that all but 2 patients showed a temporary reduction of about 50 per cent. or more in the number of fits at the time pellagra first developed or during its progress. In one case a second pellagra attack was allowed to take place and again a reduction in the number of fits was noted. In all cases after pellagra symptoms had been present for a variable time, depending upon the condition of the patient, treatment by yeast was instituted and cure soon followed. There was a tendency for the number of fits to increase again after the anti-pellagra treatment was begun.

A second group consisting of 8 white female epileptics was also investigated. The same basic diet as before was begun on June 23rd 1930. Seven of these patients developed pellagra by November 30th. This group also showed the same favourable effect of pellagra upon the epileptic attacks.

The explanation of this phenomenon is not yet clear. Deficiency in anti-pellagra vitamin may be responsible, but it is more probable that pellagra, acidosis and dehydration are merely indications of a more profound metabolic change which may account for the favourable effect on the epileptic state. *A. D. B.*

TEGLBJAERG (Else) & TEGLBJAERG (H. P. Stubbe). Sekundaer Pellagra. [**Secondary Pellagra.**]—*Hospitalstidende.* 1933. Mar. 30. Vol. 76. No. 13. pp. 356–364. With 6 figs. on 2 plates.

Having had their attention drawn to the possibility of cases of secondary pellagra being overlooked in asylums, Else and H. P. Stubbe Teglbjaerg have scrutinized the present material as well as the records of discharged patients of a Danish mental hospital.

In the course of only half a year they have found five cases of secondary pellagra in this hospital, and their study of the records of discharged patients has led them to diagnose secondary pellagra in three other cases. The dietary of the hospital being such as to provide sufficient vitamin B_2 under normal conditions, the development of pellagra in these eight cases must probably have been due to defective vitamin absorption for which coincident or pre-existing disease of the digestive tract must be held responsible. In every case in which a diet rich in vitamin B_2 was prescribed, together with yeast or the Danish preparations, biosan or spinatin, a satisfactory response was observed. The authors suspect that secondary pellagra is a comparatively common disease in Danish asylums among those inmates who refuse to eat or are subject to chronic disease of the digestive tract. *C. Lillingston.*

SPIES (Tom Douglas). **Pellagra: an Experimental Study of the Skin Lesions.**—*Proc. Soc. Experim. Biol. & Med.* 1933. June. Vol. 30. No. 9. pp. 1227–1228.

Pellagrins fed upon a diet of cornstarch and lactose showed definite improvement in their skin condition.

In a previous paper the author has shown that the skin lesions of pellagrins actually improved when they were fed upon a so-called pellagra-producing diet [see this *Bulletin*, Vol. 30, p. 550]. The following is a continuation of that work using a diet even more restricted than before. Ten patients with typical pellagrous dermatitis were fed upon a diet of cornstarch and lactose (2,000–3,000 calories per day). Two of the patients were unable to tolerate the diet and had to be excluded, but 8 showed definite improvement in the skin condition during the first 6–15 days. Stomatitis was adversely affected, but those cases having no stomatitis at the beginning of the experiment did not develop it. None showed signs of nervous system involvement. It may be that "the specific chemical substance related to the development of the dermatitis is not the same as that affecting the other manifestations of pellagra." Previous workers may have laid too much stress on the healing of skin-lesions in therapeutic experiments. *A. D. B.*

MULHOLLAND (H. B.) & KING (R. L.). **Pellagra. Review of Cases with Special Reference to the Gastric Secretions.**—*Jl. Amer. Med. Assoc.* 1933. Aug. 19. Vol. 101. No. 8. pp. 576–579. [11 refs.]

Out of 107 pellagra cases 77 (72·0 per cent.) showed absent free hydrochloric acid in the gastric contents. The use of histamine did not materially change the anacidity percentage, which suggests that the anacidity is of the "true" type.

The authors give the following summary :—"The results of gastric analyses in 107 typical endemic cases of pellagra admitted to the University of Virginia Hospital during the past eighteen years confirmed the results found by previous observers in regard to the common occurrence of achlorhydria in this disease, even after due allowance has been made for the presence of this condition in normal persons of different ages. The examination of some patients indicated that this condition might be more or less permanent (true anacidity), but in a few instances some degrees of normal function returned. The assumption, however, that the presence of achlorhydria was necessarily correlated with such other manifestations as stomatitis, diarrhoea, involvement of the central nervous system and anaemia was not borne out by

this study. There is no implication that achlorhydria is a primary or uniformly antecedent manifestation of this deficiency disease syndrome." *A. D. B.*

WHEELER (G. A.) & HUNT (D. J.). **The Pellagra-Preventive Value of Green Cabbage, Collards, Mustard Greens, and Kale.**—*Public Health Rep.* 1933. June 30. Vol. 48. No. 26. pp. 754–758.

An account is given of experiments upon the human subject to test the pellagra-preventive value of green cabbage, collards, mustard greens and kale.

These articles were added to a basic diet which is known to produce pellagra in 3–6 months. P.P. factor is not appreciably affected by the heat applied in the process of canning. The experiments were continued in each case for one year. The authors give the following conclusions: "(1) Canned green cabbage and canned mustard greens contain the pellagra-preventive factor and, though not fully adequate in themselves, may be regarded as quite practicable contributory sources for supplementing otherwise pellagra-producing diets. (2) Canned collards and canned kale are satisfactory pellagra-preventive supplements, at least when used in relatively large proportions." *A. D. B.*

LOWE (John). **Further Notes on Pellagra in Hyderabad, Deccan.**—*Indian Med. Gaz.* 1933. July. Vol. 68. No. 7. pp. 379–381. With 2 figs.

Pellagra is found in the general population of Hyderabad as well as in the local leper hospital.

The author has previously (1931) described pellagra in the Leprosy Hospital, Dichpali [see this *Bulletin*, Vol. 29, p. 94]. Thirty new cases appeared during the cold weather of 1931–32. Observation suggests that the disease exists also in the general community apart altogether from leprosy. Hyderabad has a dry cool season in which the difference between sun and shade temperature is very marked. This leads to drying and cracking of the skin and though this condition is not, of course, due to pellagra it appears that persons severely affected in this way are more apt to develop the disease. Glossitis is a very characteristic feature. Of 7 patients who suffered from pellagra in 1930–1931 and were kept under observation only 2 relapsed during 1931–1932. In previous years the death rate was 25 per cent. but in 1932 when all marked cases were treated there were no deaths. Treatment consisted of the addition of ½ lb. meat per day to the usual diet of rice, dal and jawari. Powdered medicinal yeast, 60 grains three times a day, was also given. *A. D. B.*

RAMAN (T. K.). **Pellagra in Guntur.**—*Indian Med. Gaz.* 1933. July. Vol. 68. No. 7. pp. 381–383. With 3 figs.

A clinical account with photographs of 4 pellagra cases observed at Guntur. Previously no cases had been reported in the Madras Presidency.

Case 1.—Hindu male (age 30) typical rash and chronic dyspepsia—ulcerative stomatitis and mental symptoms—no further investigations made as he refused to stay in hospital. *Case* 2.—Hindu female (age 35) history of rash for 7 years—typical skin appearances, glossitis, diarrhoea and anaemia—death occurred from extreme weakness and anaemia—

autopsy revealed the usual findings. *Case* 3.—Hindu male (age 14) seen apparently in second attack—symptoms gradually disappeared on liver extract (8 ozs. daily) toddy (6 ozs.) and bread and milk. *Case* 4.—Mahomedan male (age 20) seen in second attack—his previous diet consisted of milled rice (4 ozs. three times a day), meat (once a week), vegetables (2 ozs. daily) dal, fish, buttermilk and ghee. He had never eaten maize. The patient was given toddy (8 ozs. per day) and tonics. He improved for a time, but relapsed later in spite of treatment. *A. D. B.*

CLEMMESEN (Svend). **Experimental Pellagra in Rats.**—*Acta Path. et Microb. Scandinavica.* 1933. Vol. 10. No. 3. pp. 304–314. With 15 figs.

"A description is given with photographs of some typical cases of pellagra in rats; concurrent gangrene of the tail and priapism are described."

GOLDBERGER and LILLIE first demonstrated that rats fed upon a vitamin B-free diet with the addition of adequate amounts of vitamin B_1 developed pellagra. In the experiments here described young albino rats stunted in growth by being kept on a vitamin B-free diet were used. These animals were kept alive for as long as 78 weeks by giving them a small weekly addition of about 0·5 gm. autolysed dry yeast. The earliest pellagra symptoms is slight scaliness of the skin of the hind paws between the toes. Later these patches become dark red in colour and crusts form. These become blackish owing to sub-epithelial haemorrhages. This appearance was usually noticed in from 16–23 weeks, but in sensitive animals it developed in about 4 weeks. Other regions affected are the fore paws, tip of muzzle, the ears and about the eyes. Irregular patches of epilation, dermatitis and crust formation may occur on the chest, flanks and back. The lesions are nearly always symmetrical. All the pellagra symptoms disappeared within 2 weeks when the animals were given a normal diet with sufficient yeast.

Thirty-nine of the 44 pellagrous rats developed a lesion at the tip of the tail which in 30 went on to gangrene. Priapism was noted in 21 out of 24 male rats. *A. D. B.*

CLEMMESEN (Svend). Om experimentel Pellagra og dens Betydning for Opfattelsen af Sygdommens Aetiologi. [**Experimental Pellagra and its Influence on the Conception of the Aetiology of this Disease.**]—*Hospitalstidende.* 1933. Mar. 30. Vol. 76. No. 13. pp. 349–356. With 4 figs. on 2 plates.

In addition to giving an account of a case of pellagra in a human being, Clemmesen describes the changes observed in young rats fed on a pellagra-producing diet. When young rats are fed on highly purified casein and starch, to which codliver oil or butter has been added in sufficient quantities to assure an adequate supply of vitamin A, the rats die in a few weeks of beriberi. If, however, vitamin B_1 is supplied by the administration of an 85 per cent. alcoholic extract of maize flour dried on starch, the rats do not develop polyneuritis, but after some months 50 to 60 per cent. of them contract pellagra. Clemmesen has succeeded in arresting the growth of young rats on a diet deficient in vitamin B and has then kept them alive for many months on a small weekly dose of yeast, containing enough vitamin B_1 to prevent fatal polyneuritis, but not enough vitamin B_2 to prevent pellagra. After describing the manifestations of pellagra in the rat, Clemmesen states

that they all disappear quickly when sufficient yeast is given. But in the human case he describes, pellagra was contracted although an apparently adequate supply of vitamin B_2 was present in the patient's food. It is suggested that the chronic gastritis and achylia from which he also suffered were responsible for faulty absorption or metabolism of vitamin B_2. *C. Lillingston.*

CAMPBELL (Coyne H.). **A Chemical Peculiarity of Pellagra Blood (Rapid Iodin Decolorization). Preliminary Note.**—*Amer. Jl. Med. Sci.* 1933. Aug. Vol. 186. No. 2. pp. 266–270.

The erythrocytes of pellagrous blood decolourize iodine solutions more rapidly than do erythrocytes in normal and other pathological conditions. A laboratory test based upon this observation is described.

The technique of the test is briefly as follows :—

5 cc. normal (control) blood and suspected pellagrous venous blood are collected in 15 cc. centrifuge tubes containing 5 cc. liquid petrolatum. The tubes are well shaken and allowed to stand for 30–45 minutes, after which they are again vigorously shaken and centrifuged at 1,000 revs. per minute for 5 minutes. Three layers will be noted, the lowest being called the erythrocytic layer. 1 cc. of the erythrocytic layer is removed and placed in tubes and exactly 1 hour after the original withdrawal of the blood slowly and without shaking is added to each tube 5 cc. of an alcohol-ether mixture. The tubes are then stoppered and allowed to stand for about 6 hours at room temperature. At the end of this time to each tube is added 0·1 cc. Lugol's iodine solution ; the contents are gently mixed and the tubes re-stoppered. As the mixtures stand, a gradual decolouration will be noted, more marked in the pellagra samples, so that within 3 hours pellagrous blood may be completely decolourized while other samples are not. Most constant differences occur after the tubes have stood for 12 hours. The tubes are then compared with potass. dichromate solutions of varying strength as colour standards and the reactions graded as mild, moderate, severe or negative.

One hundred and fifty cases, 50 of which were pellagrins, were tested in this way. Thirty-seven definitely diagnosed untreated pellagrins gave moderate to severe reactions. Ten pellagrins treated for 2–4 months gave negative to mild and moderate reactions. Six suspected cases gave mild to moderate and severe reactions. Three cases of active pellagra complicated by other diseases gave severe reactions. All other cases gave negative results, except 8 undiagnosed patients, who though pellagra was not suspected nevertheless gave moderate to severe reactions. *A. D. B.*

HOFFMAN (Frederick L.) ; HARRIS (Leslie J.) ; HOFFMAN (Frederick L.). **Deaths from Pellagra.** [Correspondence.]—*Brit. Med. Jl.* 1933. Sept. 30, Oct. 7 & Nov. 18. pp. 623 ; 665–666 ; 943–944.

L. J. Harris in a recent address stated that no fewer than 30,000 individuals died from pellagra in one year recently in the southern parts of U.S.A. Hoffman, writing from Massachusetts, states that the mortality from pellagra has probably never been more than 7,000 in the course of any one year and gives the figures from 1927 to 1931, amounting to 30,000 for the 5-year period. Harris writes that he was referring to 1915 when PETERSON cited the official return of 10,663

deaths but considered the real mortality to have been 16,000 to 19,000. He does not say how he arrived at 30,000, but he would regard that " as a peak value."

Hoffman says further that there was a decline of pellagra in all the States for 1932. He draws attention to the excessive frequency of pellagra among females and gives a table of frequency in age periods for 1929, from which it appears that 45–54 years is the period at which pellagra deaths are most numerous. In U.S.A. at the present time the pellagra death rate is about 60 per million.

In his second letter Hoffman gives further figures from the U.S.A. Census Office and with reference to HARRIS' letter writes " No one has a right to broadly guess at a mortality figure and then defend it as a statement of fact." He gives a table of the mortality from pellagra in Italy from 1887 to 1928. This was 13·4 per 100,000 in 1890–2 and has since steadily diminished till in 1928 it was only 0·2. The actual diminution in deaths has been from 4,095 to 85. *A. G. B.*

RAJADHYAKSHA (B. H.). A Case of Pellagra.—*Bombay Med. Jl.* 1933. Mar. Vol. 2. No. 3. pp. 49–50. With 2 figs. & 1 chart.

SULLIVAN (Elizabeth Ann). Insulin Therapy in Post-Pellagrous Trophic Ulcers. —*New England Jl. of Med.* 1933. Aug. 3. Vol. 209. No. 5. pp. 241–242.

WHEELER (G. A.). Pellagra: a Review of Recent Literature.—*Southern Med. Jl.* 1933. July. Vol. 26. No. 7. pp. 648–653. [12 refs.]

PLAGUE.

STRICKLAND (C.). **An Analysis of Seven Years Epidemics of Plague involving 2,520 Infected Villages in the Belgaum and Dharwar Districts, Bombay Presidency.**—*Indian Jl. Med. Res.* 1933. July. Vol. 21. No. 1. pp. 29–65. With 3 charts.

In this analysis of the epidemic history of two Bombay districts the case records of a large number of infected villages have been scrutinized and charted. They reveal that the epizootic season extends from the middle of May to the middle of January, when the off season commences. It is during the off-season that anti-plague measures should be conducted with increased vigour.

A secondary rise of human plague incidence occurred in January "when the annual epidemic reaches its zenith, but the flea-rate is then near its minimum." That rise may find its explanation in the transport of the harvest "in spite of the low flea prevalence." Climatic and other conditions even in neighbouring districts may bring about variation in the incidence of plague. "It is essential, therefore," the author concludes, "that there be made a preliminary survey of the plague records" to determine when anti-plague operations are likely to have the greatest possible effect. *W. F. Harvey.*

KING (H. H.) & IYER (P. V. Seetharama). **The Seasonal Prevalence of Rats and Rat-Fleas in Parts of South India.**—*Indian Jl. Med. Res.* 1933. Apr. Vol. 20. No.pp. 1081. 4. 67–10 With 1 chart.

This is an epidemiological study of importance, because it seeks to measure the effect of climate and anti-plague operations in a very systematic fashion. Briefly stated it has been carried out by surveys in localities which were representative of different types of climate, and although the data are somewhat scanty, the conclusions from them may perhaps hold for South India generally.

These may be summarized :—(1) The density of the rat population is higher during the cold weather and decreases during the hot weather, which decrease may be followed by a south-west monsoon rise. (2) Municipal trapping in one locality has not resulted in an appreciable decline in the rat population. (3) The average size of litter was fairly uniform for any one locality at all seasons of the year, nor had seasonal changes much effect on the pregnancy rate. (4) Both the general and the specific flea indices were markedly low during the hot weather months, when temperature was high but humidity was low. (5) *X. astia* appeared to be the first to respond, by increase, to the fall in the temperature and rise in humidity brought about by the south-west monsoon. (6) "With the onset of the cold weather after the north-east monsoon, *cheopis* continues to increase and increase very greatly. At this time *braziliensis* begins to increase. *Cheopis* seems to be the species most affected by seasonal changes." *W. F. H.*

IYER (P. V. Seetharama). **A Rat-Flea Survey of the Mysore State.**—*Indian Jl. Med. Res.* 1933. Apr. Vol. 20. No. 4. pp. 975–994. With 1 map.

The fleas, to the number of 4,577, were collected on *R. rattus* and were representative of all three species of *Xenopsylla*. Relative prevalence of these species, *astia*, *braziliensis* and *cheopis*, is best shown

by their specific indices, 1·12, 2·74 and 3·1 respectively. A striking fact was that the indices for *astia* and *cheopis* varied little from place to place but that for *braziliensis* varied greatly. Another point of difference between species was that while the females of *X. cheopis* and *braziliensis* were only 36 and 33 per cent., they totalled 57 per cent. in the case of *X. astia*. A strong association is made out of *X. cheopis* with the cotton trade and *X. brasiliensis* with the grain trade. Both these species appear to be concerned with the transmission of plague but, as usual, the evidence is against *X. astia*. *W. F. H.*

i. Evseeva (V.) & Firsov (I.). **The Suslik Fleas as Reservoirs of Plague Virus during Winter.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1932. Vol. 11. No. 4. pp. 281–282. [In Russian. English summary p. 283.]

ii. Poljak (I.) & Toumansky (V.). Le changement de taux saisonnier des puces dans les terriers des spermophiles *Citellus pygmaeus* Pall. au région de N. Tchirskaja. [**Seasonal Variation of the Fleas in the Burrows of Spermophiles,** *Citellus pygmaeus*.]—*Ibid.* pp. 285–286. [In Russian. French summary p. 287.]

i. Fleas to the number of 5,363 were collected from the nests of susliks (ground squirrels), fed upon guineapigs and susliks infected with plague, and the nests with fleas replaced in the ground at the depth of a suslik burrow. Examinations were made of these fleas 3, 6 and 7 months later. Of 138 living fleas dug out from the 3rd nest, 7 months 12 days after the original feeding, 9 were found to contain plague bacilli. The experiment confirms the suggestion that plague bacilli may be preserved in fleas during a non-epizootic period and "carry the disease over from one epidemic period to another."

ii. The mean number of fleas per nest was 60, the maximum of fleas captured was in March and the minimum in September. The species found were: *Neopsylla setosa* (80·57 per cent.), *Ctenocephalus pollex* (7·58 per cent.), *Ceratophyllus tesquorum* (9·05 per cent.), *Frontopsylla semura* (2·21 per cent.) and *Rhadinopsylla uterainica* sp. n. (0·56 per cent.). *W. F. H.*

Sicé (A.). Note relative aux porteurs insoupçonnés du bacille de Yersin. [**Unsuspected Carriers of Plague.**]—*Bull. Soc. Path. Exot.* 1933. May 10. Vol. 26. No. 5. pp. 688–692. [13 refs.]

The argument developed by the author is directed to the support of the possibility that man as well as the rat may be an agent in the propagation of plague.

Types of carrier which are considered are, (1) the healthy carrier; (2) the carrier of a localized symptomless lesion; (3) the ambulatory carrier; and (4) the chronic carrier. His illustrative case was a man of apparently good health, with no elevation of temperature whose only lesion consisted in a group of isolated, movable, painless glands in one groin. Puncture of the largest of these glands furnished a fluid which on microscopic examination showed what, morphologically, were plague bacilli. The examination was repeated weekly for about a month, always with the same result. Cultural and serological tests could not be applied. *W. F. H.*

LEGER (Marcel). *Pestis levissima.—Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 762–764.

The term *Pestis levissima* is proposed by the author as preferable to *Pestis minor*, which he would reserve for a modified slight plague infection. In these cases of *Pestis levissima*, otherwise called healthy carriers, there are no symptoms except minute enlargements of lymph nodes, which are neither inflamed nor tender. Such enlargements may frequently be found in normal natives of the countries concerned, but the enlargements here referred to yield fully virulent plague bacilli by puncture. Other names which have been used for such a condition are latent plague and carriers of a silent local reaction. *W. F. H.*

DE ROZARIO (C. F.). **A Case of Cutaneous Plague.**—*Indian Med. Gaz.* 1933. July. Vol. 68. No. 7. p. 396.

The patient, 22 years of age, was admitted to hospital after 4 days' illness with high temperature, but not looking at all ill. An acute spreading ulcer was present on the chest, which had started as a pustule, and a small hard mass was situated 4 inches above this. Two more spreading ulcers appeared and the ulceration covered finally about a square foot. Keratitis developed and the cornea was completely destroyed. Cervical, femoral and epitrochlear lymph nodes showed enlargement but not until the 12th day of the disease. There were no buboes at the time of admission. Although the patient was very seriously ill, he recovered. Smears from the ulceration showed *Past. pestis* and this finding was subsequently confirmed by animal experiment. *W. F. H.*

ROBIC (J.). Note sur le traitement de la peste par le bactériophage. [**Treatment of Plague by Bacteriophage.**]—*Bull. Soc. Path. Exot.* 1933. May 10. Vol. 26. No. 5. pp. 756–760.

In this trial the bacteriophage which had proved successful at Dakar was used. It was tested for activity, was adapted to the plague strains of Antananarivo, showed practically the same activity for all the plague strains used in its preparation, was freshly prepared and was polyvalent. A test of the activity of the phage was also made with regard to a plague bacillus isolated from one of the patients treated. This was perfectly lysed. The use of the phage in pneumonic plague was absolutely without any effect. Of the five cases of bubonic plague treated three died and two recovered, but the author seems to discount the recoveries as therapeutic successes by relating how a patient had recovered by self-treatment with crushed pimento. His conclusion is that while the plague phage was active against laboratory strains it was unsuccessful in its application to treatment. *W. F. H.*

FADDEEVA (T.). **The Rôle of Ticks in the Transmission and Preservation of Plague Virus. I. Experimental Infection of** *Argas persicus* **with Plague.**—*Rev. Microbiol., Epidémiol. et Parasit.* 1932. Vol. 11. No. 4. pp. 273–278. [12 refs.] [In Russian. English summary p. 279.]

In this, the first of a series of experiments, the tick used was *Argas persicus* which was fed upon infected guineapigs when bacteraemia was at its height. To prove the presence of living plague bacilli the ticks were ground up to make a suspension in normal salt solution and

this was used to inject mice and to inoculate agar plates. The results showed that ticks can be infected and remain infective for as long as 110 days after the original meal. *W. F. H.*

BONCINELLI (U.) & ARADAS (A.). Sui rapporti tra *P. pestis* e *B pseudotuberculosis rodentium.* I. Valore di alcuni mezzi culturali di differenziazione; saggi di agglutinazione aspecifica su stipiti normali e dissociati. [**Differential Culture Media for** *Past. pestis* **and** *Past. pseudotuberculosis rodentium.* **Non-specific Agglutination.**]—*Boll. Istituto Sieroterap. Milanese.* 1933. May. Vol. 12. No. 5. pp. 346–362. [40 refs.] German summary.

Many of the media which have been suggested for the differentiation of the plague and pseudotuberculosis bacilli were tested and only that with the composition rhamnose-peptone water was found satisfactory. The authors propose an asparagin-carbohydrate synthetic medium of pH6 with bromthymol blue indicator as a further improvement, by which various strains of pasteurella organisms can be ranged in succession from the haemorrhagic septicaemia strains which are the earliest to alter the colour of the medium to the *P. pestis* which is the latest. Trials were also made of various non-specific agglutinating substances and it was found that trypaflavin agglutinated " R " type organisms, to which the plague bacillus belongs, and failed to agglutinate " S " type organisms to which the *P. pseudotuberculosis rodentium* belongs. With alteration of the latter to an " R " type it acquired and retained the reactions of a plague bacillus. *W. F. H.*

PANDIT (C. G.), MENON (K. P.) & IYER (P. V. Seetharama). **A Note on the Sun Disinfestation of Grains as a Measure in the Prevention of Plague.**—*Indian Jl. Med. Res.* 1933. Apr. Vol. 20. No. 4. pp. 1039–1044.

The utilization of solar radiation for purposes of disinfection in tropical countries is a method which, if it could be rendered practical, would have the great merit of being inexpensive. In this series of experiments it was applied to the disinfestation of grain in gunny bags from fleas, as a plague preventive measure.

One thermometer was placed on the top of the bag, another just inside and touching the gunny, and four other thermometers at successive depths of about 4 inches, with readings every hour from 10 a.m. to 4 p.m. A number of different grains were used and interesting differences in the records were due to that fact alone. The basal fact which to some extent determined these trials was the known finding that " a temperature of 49°C. for 45 minutes is essential for the destruction of fleas." On this finding the sun trials made have been declared a failure in practice. " It would not be possible to obtain this critical temperature *on all days* and as the temperatures in the interior of gunny bags had always been lower than the critical one . . . it would not be possible to have the entire grain so disinfested." *W. F. H.*

ORI (Alessandro). Sterilizzazione del maiz infetto da bacillo della peste. [**Sterilization of Plague-Infected Maize.**]—*Ann. d'Igiene.* 1933. Apr. Vol. 43. No. 4. pp. 276–287. [23 refs.]

The occasion giving rise to this research was the arrival in a port of a grain-carrying steamer, some of the crew of which had suffered from plague and on which rats had been found dead with plague. A series of experiments instituted by the author led to the

conclusions that :—(1) The plague bacillus when sheltered from light can remain alive and virulent on maize for 54 days. (2) Plague infected maize when placed in the centre of a large quantity of the grain in the hold of a boat remains virulent for 14 days. (3) The grain, infected with plague, can be sterilized effectively by being kept in a drying chamber for 10 mins., at 70°C. (4) Half an hour in the chamber at 65°C. is sufficient to kill the insects with which the maize is infested and these temperatures cause no appreciable alteration in the appearance, the germinating power or the water content of the grain.

W. F. H.

FLU (P.). Immunisation des rats contre la peste au moyen de suspensions concentrées de bacilles pesteux virulents lysés par le bactériophage antipesteux. [**Immunization of Rats by Bacteriophage Lysates of Concentrated Suspensions of Plague Bacilli.**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 796–806. [15 refs.]

——. Immuniseering van ratten tegen pest door middel van geconcentreerde bacteriophaaglysaten van virulente pestbacteriën (2e mededeeling). [**Plague-Immunization of Rats by Phage-Lysates of Virulent Bacteria.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Aug. 15. Vol. 73. No. 17. pp. 1045–1058. [Refs. in footnotes.]

Flu has for some time drawn attention to the advantages of lysates by bacteriophage for protective vaccination. These lysates should be of concentrated bacterial suspensions and the organism should be virulent, because it is the bacterial substance that is the real immunizing agent and not the bacteriophage. It is this fact also which explains the successes and the failure of many other workers with such lysates, which may contain abundance of phage but little dissolved bacterial substance. An important feature of the phage lysate, concentrated though it is, is the absence of reaction on inoculation. The author summarizes his present work as follows :—

The vaccine-lysate protects 91 per cent. of animals against an infection with 10,000 minimum lethal doses and maintains its potency for at least 4 months at room temperature. To prepare the vaccine, a suspension of 24-hour old virulent plague bacilli in bouillon containing 5,000,000,000 bacteria per cc. is mixed with 2 per cent. virulent bacteriophage and incubated for 36 hours at 37°C. The partially lysed suspension is filtered through cotton wool, shaken up with an excess of chloroform and again left for 12 hours at 37°C. The fluid is then carefully decanted from off the chloroform and carbolized to ½ per cent. It is now allowed to stand for 5 days at room temperature, when it is tested for sterility. Before use it is necessary to shake up the fluid, which is not wholly clear.

W. F. H.

PONS (R.) & ADVIER. Méthode expérimentale d'étude du pouvoir immunisant d'un vaccin anti-pesteux. Son application à un vaccin huileux et à un vaccin aqueux. Recherche de la phase négative et de l'action anergisante de la vaccination anti-pesteuse. [**Experimental Studies on Lipo- and Aqueous Plague Vaccine. Negative Phase and Stimulation of Infection by Vaccination.**]—*Ann. de Méd. et de Pharm. Colon.* 1933. Jan.–Feb.–Mar. Vol. 31. No. 1. pp. 5–24.

After various trials subcutaneous inoculation was adopted as the surest method of testing the immunity of vaccinated animals. Grey

mice (*Mus musculus*) were used as the test animals and 1/10 cc., containing a suspension of 200 bacilli, as the test dose. An interval of 10 days elapsed between this test dose and the previous prophylactic vaccination. The lipo- and the aqueous vaccine gave a 70 and 51·5 per cent. survival of the test animals respectively as compared with a 20 per cent. survival of control unvaccinated animals. As regards the negative phase of vaccination the authors found that instead of a diminution of resistance a slight increase of resistance was already evident in 24 hours after vaccination and that this steadily increased up to the 8th day. An injection of vaccine, however, given on the same day that an animal had been infected or during the actual evolution of the disease aggravated the disease. *W. F. H.*

Reynal (J.) & Wassilieff (A). Prophylaxie de la peste à Tunis, La station municipale de surveillance murine (laboratoire du rat). Son fonctionnement pendant une année (mai 1932–avril 1933). [**Prophylaxis of Plague in Tunis.**]—*Arch. Inst. Pasteur de Tunis.* 1933. July. Vol. 22. No. 1. pp. 122–136. With 5 figs.

The technique of examination of rats for plague is to make direct films from the spleen and if these should prove suspicious of plague infection to send the organs in a sterile tube to the laboratory. Inoculations are made from the organs on agar and suspensions of the organs injected into or rubbed into the skin of guineapigs. In every case, whether suspicious or not, one hind leg of the animal is sent to the laboratory, where it is cut across through the middle of the femur, the cut surface flamed, and the bone marrow sown with a platinum needle on agar. This use of bone marrow for sowing material has much to commend it especially as it is less liable to be contaminated than the spleen, liver or lung.

An investigation into the sex of the species of rats caught showed that for *E. decumanus* females were greatly in excess over males, for *E. rattus* they were in equal number and for *E. alexandrinus* the females again predominated. *W. F. H.*

Otten (L.). Experimenteele vaccinatie tegen pest. I. Gedood vaccin. [**Experimental Plague Vaccination. I. Dead Vaccine.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. July 4. Vol. 73. No. 14. pp. 835–857. [22 refs.]

——. **Experimental Vaccination in Plague. I. Dead Vaccine.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1933. Pt. 2. pp. 61–80. [22 refs.]

By " dead " vaccine is meant one consisting of killed organisms or their products, whether this has been effected by heat, antiseptic or bacteriophage. A very useful précis of the literature on the subject, dealing with type of vaccine, dose, test animal, mortality during immunization, interval to testing dose and percentage survival is given, beginning with the work of Kolle and Otto (1903–4) and ending with that of Schütze (1922) and Flu (1932). The record of a certain amount of the author's own experimental work follows, which leads to important deductions. The susceptibility of different laboratory animals varies greatly and may lead accordingly to favourable or unfavourable vaccination results. For guineapigs the injection of a single virulent plague bacillus will determine a high mortality; the reverse is the case for a wild house rat. The susceptible guineapig is the

most difficult to immunize to virulent plague, while the less susceptible tame white rat is very easy. Wild house rats are intermediate between the two, but the tame white mouse corresponds as regards susceptibility to the house rat and approaches the tame white rat in respect of immunization results. Another of the deductions made is that the results of vaccination are very dependent on the size and type of the infecting dose. It cannot be said that the more susceptible the animal the worse the vaccination results will be or vice versa, for the white mouse proves an exception. The bearing of such facts upon the immunization of man is obvious and it would require, if it were possible, the use of the anthropoid apes to obtain veracious experimental results. The author refers to the fallaciousness of the statistics commonly presented of immunization of human beings against plague. His own results in Java during 1920–1922 on an alternate-case basis gave a diminution of mortality in the vaccinated to one half, a reduction which was considered, however, too small for the application of compulsory inoculation to the population.

All the work done on plague immunization points insistently to the necessity for the adoption of a standard method of testing.

W. F. H.

Barrett (R. E.). Epidemiological Observations on Plague in the Lango District of Uganda.—*East African Med. Jl.* 1933. Sept. Vol. 10. No. 6. pp. 160–180. With 2 charts & 1 plan. [17 refs.]

Bohec (J.). Peste et Ratproofing.—*Ann. d'Hyg. Pub., Indust. et Sociale.* 1933. July. Vol. 10. No. 7. pp. 381–388.

Dujardin-Beaumetz (E.). Remarque à propos de la communication de Marcel Leger sur les cas de *Pestis levissima.*—*Bull. Soc. Path. Exot.* 1933. July 12. Vol. 26. No. 7. pp. 892–893.

Fabiani (G.). Nouveaux éléments de différenciation entre le bacille de la peste et le bacille de la pseudotuberculose des rongeurs.—*C. R. Soc. Biol.* 1933. Vol. 113. No. 26. pp. 1198–1200.

Johnson (F. H.). Report of a Case of Septicemic Plague in which practically the Only Symptom was an Elevated Temperature.—*U.S. Nav. Med. Bull.* 1933. July. Vol. 31. No. 3. pp. 311–312.

Tschernobaew (W.). Ueber den Kern bei *B. pestis* in Bouillonkulturen.—Reprinted from *Rev. Microbiol., Epidémiol. et Parasit.* 1932. Vol. 11. No. 4. pp. 255–257. With 1 fig. [In Russian. German summary p. 257.]

Webster (W. J.). Notes on the Study of Plague in the Field.—*Indian Med. Gaz.* 1932. Dec. Vol. 67. No. 12. pp. 693–696.

CHOLERA.

OUCHI (T.). Recherches épidémiologiques sur le choléra à Changhai. Quelques observations au sujet des porteurs de germes cholériques. [**Epidemiology of Cholera in Shanghai. Observations on Carriers.**] —*Bull. Office Internat. d'Hyg. Publique.* 1933. June. Vol. 25. No. 6. pp. 998–1005.

Every year Shanghai is attacked by cholera in the summer but never in winter or in spring. Under these circumstances it is not easy to understand how this disease can be endemic. Shanghai lies at a distance of about 1,500 miles from the three possible foci, Indochina, Siam and the Philippines. The epidemiological observations of the last five years give the impression that cholera has been carried from South to North by vessels coming from Chinese ports. If, however, the view were accepted that cholera is actually endemic in Shanghai it would be necessary to determine how the vibrios are maintained by carriers during the off-season or, as an alternative, how the vibrios survive outside the body. Both these possibilities require investigation.

W. F. H.

SHIMOJO (K.), SODA (T.) & ADACHI (K.). **On a Cholera Epidemic in Gosei, Taichu-Shu, Formosa in July, 1932.**—*Jl. Public Health Assoc. Japan.* 1933. Apr. Vol. 9. No. 4. pp. 1–2.

This is a description of a cholera epidemic, brought to a place by a ship's crew, with 17 cases and 6 carriers, 23 in all, of whom 7 died. Twenty out of the 23 persons had attended the funeral of the captain of the junk and had consumed the infected food with the crew.

W. F. H.

i. COUVY. Rapport sur les porteurs de germes de choléra. [**Cholera Carriers.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. July. Vol. 25. No. 7. pp. 1149–1170. [3 pages of refs.]
ii. ACTON ; MORISON ; STEWART (A. D.) ; TAYLOR. Les porteurs de germes du choléra.—*Ibid.* pp. 1171–1179. With 1 diagram.
iii. MCMULLEN. Sur les porteurs de vibrions cholériques aux Philippines.—*Ibid.* pp. 1180–1182.

This is a valuable review of the whole subject of cholera carriers, with a useful bibliography.

In it the investigator will find reference to the International Sanitary Conference of 1912 and to the Cholera Sub-commission of Paris in 1926 with their pronouncements. He will also find treated in the text the subjects of :—Number and distribution of carriers, proportion of agglutinable and non-agglutinable vibrios, duration of carriage, the occurrence of cholera in carriers, degree of danger from carriers, sterilization of carriers and the effect of vaccination on carriers. Under the heading " conclusions " there is given a summary of the position, mostly contained in the first sentence, which is probably the true position at the present time—" The question of germ carriers remains rather confused." Agglutinability of vibrios is an uncertain character in the absence of a *standard* agglutinating serum. Carriers are divided

into (1) those incubating the disease who are certainly infective : (2) the convalescent carrier ; and (3) the healthy carrier, the last being one of doubtful occurrence and of doubtful infectivity. No laboratory test serves to differentiate the vibrios discharged by these respective types of carrier. The serum of cholera convalescents possesses bacteriolysins and agglutinins, which are not present in the serum of the healthy carrier. As regards the effects of a satisfactory vaccination, there is little probability of finding a carrier incubating the disease, in the case of any one in whom vaccination has been carried out from 5 days to 6 months previously. The subject of sterilization of carriers requires fresh study. Whether special travel facilities should be accorded to healthy carriers with certificates of vaccination is left an open question.

ii. In this note there are given the several replies of the directors of the School of Tropical Medicine and of Institutes in India to a request for information. Acton divides carriers into (1) the acute, whose emission of typical agglutinable vibrios rarely exceeds the 14th day of the disease and (2) the carrier of the non-agglutinable vibrio which may be haemolytic or non-haemolytic. Vibrios of this latter type may make their appearance towards the 5th day of the disease but have not been met with later than the 14th day. Non-agglutinable vibrios may appear in cholera cases either at the beginning or the end of an epidemic. Hospital patients who have not been recently attacked with cholera will show in Calcutta non-agglutinable vibrios to the extent of 1 per cent. during March, April and June, the epidemic season, and none at all in the other months. In the reply of Morison a special emphasis is laid on the fact that although continued discharge of vibrios during convalescence is an actual fact, it has not been possible to point to infection arising through this agency. Stewart quotes the published figures of BRAHMACHARI, who in the endemic region of Bengal found that in an examination of 2,734 stools of healthy persons there were 344 cases with vibrios (23 agglutinable and 321 non-agglutinable). The agglutinable vibrios, however, were only found during the epidemic season. In Taylor's contribution a list of the works published from 1913 to 1931 on the subject of epidemics of cholera and the rôle of carriers was prepared and is included in Couvy's bibliography.

iii. This is quite a short note, which again voices the dubiety felt regarding truly agglutinable vibrios. " The serological identification of the cholera vibrio continues to present problems which have not yet been solved." *W. F. H.*

MASSIAS (C.). Traitement du choléra par les injections intraveineuses de solution chlorurée hypertonique et de gonacrine. [**Intravenous Injection of Hypertonic Saline and Gonacrine in the Treatment of Cholera.**]—*Bull. Soc. Path. Exot.* 1933. July 12. Vol. 26. No. 7. pp. 900–901.

The author describes his treatment of cholera with 20 per cent. hypertonic salt solution intravenously in a dose of 20 cc., renewed after 12 hours and again, if necessary, after 24 hours. Further administration of salt solution is carried on by subcutaneous injection of normal salt solution. Immediately after the intravenous injections of salt solution intravenous injections of 2 per cent. gonacrine may be given.

W. F. H.

LINTON (Richard W.) & SHRIVASTAVA (D. L.). **Studies on the Antigenic Structure of *Vibrio cholerae*. Part II. Analysis of the Carbohydrates of Pathogenic and Non-Pathogenic Vibrios.**—*Indian Jl. Med. Res.* 1933. July. Vol. 21. No. 1. pp. 91–100.

The carbohydrate composition of organisms has in recent years shed new light on the chemistry of specific immunity. In this investigation an attempt is made to attack the problem of the relationship between pathogenic and non-pathogenic vibrios from this point of view. The author has shown that all the pathogenic and non-pathogenic vibrios, smooth and rough vibrios, agglutinating and non-agglutinating vibrios and strains resistant to various cholera bacteriophages contain a very similar carbohydrate group. "Each of them possesses in its carbohydrate fraction a factor which gives a precipitin reaction with antisera to any of the others."

Four strains of vibrio were used to provide material: (1) A typical smooth, agglutinable, agglutinogenic and pathogenic *Vibrio cholerae*; (2) a rough vibrio obtained from the previous strain by cholera-phage action, which had made it non-agglutinable; (3) a smooth, non-agglutinable water vibrio; and (4) a smooth-rough agglutinable vibrio. The methods and results of analysis of the specific carbohydrates are given in detail. Tentative conclusions are drawn by the author:—"Although the specific factors of the vibrios are so closely allied that they cross-react serologically in high dilution, yet the specific substances themselves are not identical and therefore the vibrios from which they are derived are different." One of the chemical differences between a pathogenic vibrio and a water vibrio "lies in the possession of galactose by the first and arabinose by the second." Other points which emerged in this investigation were that the rough variant resulting from bacteriophage action on a smooth vibrio altered neither the character nor the amount of its carbohydrate. "In the second place the carbohydrate does not vary in composition or amount with the agglutination reaction."

The author summarizes his position with regard to his test vibrios in these words:—"The identification of their constituents has led to the hypothesis that the carbohydrate of each vibrio contains an aldobionic acid made up of galactose and glycuronic acid; that a second sugar is also present; and that in some vibrios this sugar is galactose, while in other forms it is arabinose." *W. F. H.*

STEWART (A. D.). Quelques remarques à propos des propriétés antigènes des vibrions cholériques. [**Antigenic Properties of Cholera Vibrios.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. June. Vol. 25. No. 6. pp. 995–997.

In this article there is developed the argument for the use in preparation of cholera vaccines of fresh local vibrio strains from an epidemic focus. The antigenic power of recently isolated smooth colonies is superior to that of the rough colony but smooth colonies tend to become rapidly rough at room temperature in Calcutta. Important researches have been carried out relating to the chemical structure of the cholera vibrio. The true cholera vibrio with its galactose fraction contrasts with water vibrios possessed of an arabinose fraction, but the arabinose of the latter is convertible into galactose by the action of sunlight and oxygen. Is it possible that some such change may occur in nature?

W. F. H.

CANTACUZÈNE (J.). Diagnostic microbiologique du vibrion cholérique et choix d'un antigène pour la préparation d'un sérum agglutinant. [**Diagnosis of the Cholera Vibrio and Choice of Antigen for Agglutinating Serum.**]—*Bull. Office Internat. d'Hyg. Publique.* 1933. June. Vol. 25. No. 6. pp. 984–994.

Recent work on the vibrios isolated during the Hejaz pilgrimage of 1930–31 have emphasized the need of a standard agglutinating serum for the recognition of the true cholera vibrio. The work of preparation of such a serum has been entrusted to the serological institutes of Copenhagen and Bucharest. A standard serum requires a standard antigen to produce it and this, as the author recognizes, involves a *petitio principii*, for the antigen must *a priori* be admitted to be a true cholera vibrio. The test antigen adopted should possess certain attributes.

It ought :—

(*a*) to have been isolated from the intestine of a fatal case at the height of an epidemic ; (*b*) to be specifically agglutinated by the chief sera which have been prepared at the present day, and which have been prepared with an antigen of standard character ; (*c*) to show Pfeiffer's phenomenon ; (*d*) not to be agglutinable in a titre higher than 1–500 by sera prepared with an El Tor vibrio antigen or a vibrio isolated from healthy carriers or a convalescent of more than 15 days ; (*e*) to be agglutinable by the serum of a patient who has, in an epidemic, recovered from a severe attack of cholera ; (*f*) to maintain a stable specific agglutinability and virulence for the guineapig after continued subculture on agar ; (*g*) when used as antigen, to furnish a serum agglutinating specifically the greatest possible numbers of vibrios considered to be true cholera vibrios from epidemic or endemic cholera foci.

Having passed these tests a vibrio may be said to have attained the provisional rank of a standard cholera antigen, and is then subject to more detailed study. A large number of strains have been subjected to this study. As a basis for the selection of the "standard" serum required two antigens have been chosen and monovalent sera prepared from each. Both have been obtained from fatal cases of cholera, one being an old culture and the other recent. The vibrios differed from each other in so far as one was lysosensitive to phage, the other not, and one was haemolytic, the other not. Both agglutinated true cholera vibrios in a titre over 1–20,000. These two sera are recommended for test on vibrios. A vibrio should only be regarded as truly cholerigenic if agglutinated by at least a 1–1,000 dilution of serum.

W. F. H.

ASHESHOV (Igor N.), ASHESHOV (Inna), KHAN (Saranjam) & LAHIRI (M. N.). **Studies on Cholera Bacteriophage. Part I. General Technique.**—*Indian Jl. Med. Res.* 1933. Apr. Vol. 20. No. 4. pp. 1101–1125. With 1 text fig. & 16 figs. on 4 plates. [10 refs.]

Whatever may be the particular field of research taken up, there always appears some reference to the nature of the bacteriophage itself. This article on technique forms no exception. "I have myself only too often," says Asheshov, "doubted its living nature, but each experiment invariably led to the one conclusion—bacteriophage cannot be anything but a living being." After this preliminary challenging statement, the subject matter of technique is taken very thoroughly in hand. Its value lies in this, that what applies to the cholera vibrio,

applies nearly generally to other organisms also. " The basic principle of this technique is to treat bacteriophage as an ultramicroscopic 'filtrable' living organism." Certain fallacies have to be provided against and expecially those of contamination, the use of a volumetric measure instead of the number of bacteriophage corpuscles per unit of volume, and the alteration of reaction during cultivation. Contamination with bacteriophage may be very widespread ; tap water is contaminated and the laboratory itself may be contaminated. A wealth of detail is given of the technique to be followed for the final isolation of pure-line types and must be consulted in the original. " After the presence of bacteriophage is confirmed and the well-isolated discrete clearings are obtained their morphology must be attentively studied. It is necessary to do this after as few transfers as possible," else a slow growing bacteriophage may be eliminated by the dilution of subculture. The original filtrate should always be kept in reserve. Morphology of bacteriophage clearings is a matter of great importance in isolation of pure types, while size alone is of comparatively little importance. *W. F. H.*

ASHESHOV (Igor N.), ASHESHOV (Inna), KHAN (Saranjam), LAHIRI (M. N.) & CHATTERJI (S. K.). **Studies on Cholera Bacteriophage. Part II. Classification of Bacteriophage and its Practical Application.**—*Indian Jl. Med. Res.* 1933. Apr. Vol. 20. No. 4. pp. 1127–1157. With 5 charts, 1 text fig. & 25 figs. on 6 plates.

Where a subject like bacteriophage theory is developing so rapidly, it is very essential for its understanding that detailed explanation should occasionally be supplied *ab initio*, as, otherwise, it is difficult to follow a writer's argument. This explanation is to a large extent furnished in this article together with the technique of isolation of " pure-line " or " ultra pure " phages. " A system of classification of bacteriophages based on their reciprocal compensatory action on bacterial culture, is suggested. A method called Type-Test is described giving the possibility : (1) of determining the type of bacteriophage, (2) of ascertaining the purity of a bacteriophage culture, (3) of identifying the different types present in a mixture, and (4) of testing bacterial cultures for the presence of bacteriophage (Ultra-purity Test). The use of bacterial cultures sensitive to one only of the types of bacteriophage is described." This is the summary of the work given by the authors. Size of clearings is the least important of the taxonomic characters of a phage. Their morphology too is unstable but " types of bacteriophage will almost always preserve under any circumstances the difference between themselves." Important characters are :—(1) the selective action of types and their division into those acting only on smooth bacterial elements, those acting on both smooth and rough and those acting almost exclusively on rough, (2) the unmistakably different antigenic action of the different types of phage, and (3) most important of all, the fact that vibrios which are " resistant to the action of one type of phage are still sensitive to the action of all the remaining types." These three type characters are stable and permanent and no intermediate types have been met with. A point which is well brought out is the condition for maintenance of lysis and non-appearance of secondary growth. " The lysis produced by pure-line choleraphage . . . is invariably followed by secondary growth." A permanent lysis is only effected by " combination of the best representatives of all the

types." The controversial subject of "lysogenic cultures" receives consideration and D'HERELLE's views with regard to these are more or less accepted. "They are cultures contaminated with bacteriophage or symbiotic cultures of bacteria-bacteriophage. . . . Such cultures will be actually nothing else but the secondary growth, resistant to the action of bacteriophage contaminating it." *W. F. H.*

ASHESHOV (Igor N.), ASHESHOV (Inna), LAHIRI (M. N.) & CHATTERJI (S. K.). **Studies on Cholera Bacteriophage. Part III. Virulence and Development of Bacteriophage.**—*Indian Jl. Med. Res.* 1933. Apr. Vol. 20. No. 4. pp. 1159–1188. With 3 figs. on 1 plate & 1 chart.

A specification of virulence is not easy to make out. The term is often misused and the authors lay great stress on the need of a definition for it, even though that may not be exhaustive in its characterization. They define the virulence of a bacteriophage as "its power to develop within and at the expense of bacteria." Two elementary principles enter into this definition and on these two combined depends the evaluation of the degree of virulence. The two principles are (1) the rate of destruction of bacteria and (2) the rate of multiplication of bacteriophage. Virulence is considered as an intrinsic property of the bacteriophage corpuscle and must be distinguished from the lytic power belonging to a given quantity of suspension or a given number of corpuscles. Number is not to be confused with individual potency. Full details are set out of the method of applying virulence tests. Much still remains to be investigated before finality is reached in this testing. It has to be recognized, moreover, that at present it has only a comparative, not an absolute value and, of course, can only be applied to single types. "The mixture of types can be investigated only from the point of view of its activity." Although the test is only "an estimation of the comparative rate of multiplication of bacteriophages it can be used for many purposes"; such as the choice of bacterium suitable for phage propagation. It can be used also to study the influence of environment on virulence, the possibility of increase of range of action and the influence of one phage upon another.

With this third part of the "Studies" the series, which is both important and valuable for reference, comes to an end. *W. F. H.*

PASRICHA (C. L.), DE MONTE (A. J.) & GUPTA (S. K.). **A Schematic Representation of the Variants of Cholera Vibrio produced under the Influence of Bacteriophage.**—*Indian Med. Gaz.* 1933. Aug. Vol. 68. No. 8. pp. 448–452. With 1 fig.

The authors, working with a large number of different types of cholera and other vibrio phages, have elaborated and clearly stated their views regarding the relationship of cholera vibrios, El Tor vibrios, non-cholera vibrios and paracholera vibrios. Not only have agglutinating vibrios been rendered non-agglutinable but, more important still, non-agglutinating atypical vibrios isolated in an endemic centre of cholera like Calcutta, have been rendered agglutinable. Two main types of bacteriophage have been used to bring about this variation, which is not to be called a mutation because it is reversible. The phages are the pure-line cholera phages and a closely allied series of phages isolated from waters in Calcutta, which receive the name cholera-like

vibriophages or simply vibriophages. These latter can act upon certain non-agglutinating vibrios to give secondary colonies which are not only specifically agglutinable by cholera serum but are also lysable by the pure line cholera phages. By this transformation the non-agglutinating vibrio becomes identical with the true cholera vibrio. In the laboratory then a typical cholera vibrio has been converted by the action of a cholera phage to a harmless saprophytic organism and this organism has had its true cholera characters restored to it again by the action of a cholera-like vibriophage. *W. F. H.*

COMBIESCO-POPESCO (C.) & WISNER (B.). Recherches sur l'agglutinabilité et la sensibilité au bactériophage des vibrions cholériques et paracholériques. [**Agglutinability and Phage-Sensibility of Cholera and Paracholera Vibrios.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 21. pp. 484–485.

This short note illustrates once more the divergent views held on the relation which exists between the cholera vibrio, the El Tor vibrio and those haemolytic strains which are comprehensively called paracholera vibrios. Ninety-seven organisms belonging to these classes were available for study, of which 67 were considered, at the outset, to be authentic cholera. All of these latter were agglutinated by the testing serums used and 63 were sensitive to bacteriophage. Of the 19 El Tor vibrios obtained in the pilgrimage of 1930, 15 were non-agglutinable and 4 were agglutinable by some one or other testing serum but not by others. No inagglutinable vibrio was sensitive to bacteriophage.

W. F. H.

BERNARD (P. Noël), RAYNAL (J.) & LIANG (Wang). Remarques sur quelques souches de vibrions cholériques isolés en Indochine et sur les variations de leurs caractères sous l'influence du bactériophage. (2e note.) [**Cholera Strains in Indo-China and Variation of their Characters under the Influence of Bacteriophage.**]—*Bull. Soc. Path. Exot.* 1933. July 12. Vol. 26. No. 7. pp. 896–899.

The characters investigated in this second note [see this *Bulletin*, Vol. 30, p. 536] were haemagglutination, haemodigestion and haemolysis. Out of 16 strains of cholera vibrios some have been transformed by bacteriophage from agglutinable vibrios into non-agglutinable, from vibrios giving a normal nitrose-indole reaction to those giving a strong reaction, from strongly proteolytic to weakly proteolytic and from non-haemolytic into haemolytic. *W. F. H.*

BERNARD (P. Noël) & GUILLERM (Jean). Sur la lyse transmissible du vibrion cholérique. [**Transmissible Lysis of the Cholera Vibrio.**]—*C. R. Acad. Sci.* 1933. July 10. Vol. 197. No. 2. pp. 201–203.

The authors set out from a pure culture which shows neither transmissible lysis in fluid media nor plaques in solid media and obtain from it by a method of extraction of a diastase, after only 2 to 3 hours' incubation, a transmissible lytic principle. "This substance has all the characters of an activator of the diastase which in normal cultures produces an autolysis of vibrios." *W. F. H.*

FLU (P. C.). Het El-Tor vraagstuk in verband met de bacteriologische en serologische diagnostiek der choleravibrionen. [**The El-Tor Question in Relation to Bacteriological and Serological Diagnosis of the Cholera Vibrios.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Aug. 29. Vol. 73. No. 18. pp. 1107–1137. [Refs. in footnotes.]

In this article the identity of the El-Tor vibrio with the cholera vibrio is discussed. It is purely arbitrary to consider that the agglutinable El-Tor vibrio is not a cholera vibrio. A true cholera vibrio which is, to begin with, non-haemolytic can acquire haemolytic characters. On the other hand the constancy of the haemolytic character of the agglutinable El-Tor vibrio forms a marked contrast to its inconstancy in old cholera strains. Cholera vibrios isolated from acute cases are agglutinable to titre limits, give the Pfeiffer reaction, show complement fixation with specific cholera serum, present the phenomenon of haemodigestion on 10 per cent. goat-blood agar plates with the formation of a broad green zone round colonies and fail, even after some days incubation, to haemolyse erythrocytes in 10 per cent. goat-blood bouillon. Agglutinable vibrios which show haemolysis in goat-blood bouillon should not be regarded as cholera vibrios until further careful examination. There is a possibility that cholera vibrios which have remained long in the human body develop haemolytic characters rendering them indistinguishable from the agglutinable El-Tor vibrio.

W. F. H.

ZIMMERMANN (E.). Ueber die Beziehungen zwischen Cholera- und El Tor-Vibrionen. [**Relation between Cholera and El Tor Vibrios.**] —*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1933. Vol. 79. No. 3/4. pp. 219–240. [26 refs.]

We do not yet appear to have reached finality on the subject of the identity of the cholera and El Tor vibrios. It is this latter group only which causes real difficulty. In Germany the generally accepted view, based upon the impossibility of separation of the two organisms serologically, is that they are identical. The material available for investigation consisted of 71 reputed cholera, 28 El Tor and 14 other vibrio strains. Serological tests again confirmed the view that, with the usual immune sera, a differentiation of cholera from El Tor vibrios is not possible. One of the test strains was a doubtful cholera ; if this be left out, it was found that, in a peptone water-asparagin-ammonium lactate-citrated blood medium, all the 112 strains with one exception preserved their haemolysing or non-haemolysing character. Two out of 69 cholera strains were haemolysing, whilst only one out of the 28 El Tor and 14 other vibrios showed any variability in its strong haemolysing character. It must be concluded that the place of the El Tor strain among the vibrios is not yet settled. *W. F. H.*

YEN (Albert C. H.). **Phenolphthalein Starch Medium for Rapid Isolation of** *V. cholerae.*—*Proc. Soc. Experim. Biol. & Med.* 1933. Apr. Vol. 30. No. 7. pp. 884–887.

This medium is recommended for trial in cholera and is made and used as follows :—

(1) Prepare :—Peptone (Witte) 2 gm. ; maltose 1 gm. ; pot. nitrate 0·5 gm. ; sod. carbonate (crystallized) 0·5 gm. ; sodium chloride 10 gm. ;

mag. chloride (crystallized) 0·5 gm.; distilled water 900 cc. (2) Boil 3 min. and filter. (3) Add 100 cc. 5 per cent. starch, previously boiled for 2 minutes. (4) Mix thoroughly. (5) Filter through cotton wool and then through asbestos filter. (6) Measure the amount of the filtrate. (7) Sterilize by boiling for 3 minutes. (8) Keep in ice chest till required. (9) Add, just before use, 5 cc. of the indicator phenolphthalein (saturated solution in 50 per cent. alcohol) per litre. (10) Bring the solution carefully to neutralization point (pH 8·3) by addition of either N/20HCl or N/20NaOH as required. (11) Add finally, after this neutralization, exactly 1·5 cc. N/1NaOH to give it a pH of 9·0–9·2. (12) Distribute in amounts of 50 cc. into sterile flasks for seeding. (13) Use fresh. (14) Add 0·1–0·2 cc. liquid stool or a loopful of solid to 50 cc. medium and incubate at 37°C. for 5–8 hours. (15) Watch for the decolourization of the solution that indicates growth of cholera or cholera-like vibrios. (16) Apply agglutination tests to the surface growth with known anti-cholera serum. (17) Transfer 1 cc. of growth, if decolourization is incomplete at the end of 8 hours, to fresh medium, incubate and test again.

W. F. H.

YASUKAWA (Yutaka). **Experiments on Sea Water and** *Vibrio cholerae.* —*Japanese Jl. Experim. Med.* 1933. Apr. 20. Vol. 11. No. 2. pp. 119–127. With 3 figs. [11 refs.]

Sea-borne transmission is the mode of origin of cholera in Japan in each successive year. The importance therefore of the viability of the *V. cholerae* in sea water is a matter of some importance. Its viability in an artificial sea water in a tank was 22 days on the surface and about 30 days at the bottom. If exposed to sunlight through variously coloured glass plates, sterilization was effected through the colourless and cobalt glass plates within 2 hours. The cholera vibrio lives longer in sea water than in fresh and the most favourable salt concentration was that of equal parts fresh and sea water with a specific gravity of 1·0137. Magnesium chloride was found to have "a far more favourable influence on the viability of Vibrio cholerae than any other salt."

W. F. H.

CHEN (W. K.). **Rough Forms of** *Vibrio cholerae* **from Convalescents.**— *Proc. Soc. Experim. Biol. & Med.* 1933. Apr. Vol. 30. No. 7. pp. 887–891.

Twenty-one positive cases were investigated and 18 of these were followed right through convalescence.

During the early acute stage of the disease when cholera phage had not appeared positive pure colonies of smooth type and lysable by cholera phage were obtained in abundance. With convalescence and the appearance of cholera phage, smooth colonies became scanty or disappeared and rough resistant variants with low titre agglutination of 1 in 160 to 1 in 640 took their place. These variants also showed impaired motility and non-motile colonies of rough cholera vibrio were isolated in 4 cases. The motility could be restored by subculture. One of the most interesting observations in this research was the finding in 5 of the convalescents a few colonies of absolutely non-agglutinable cholera-like vibrios. A well planned test of the serological relationships of these three classes of vibrios was conducted with the appropriate sera for each. As a result of these tests the author concludes that there is no evidence to show positively that the non-agglutinable cholera-like vibrios were mutants of the true cholera vibrio, nor could they be brought back to

true cholera vibrios. The slightly agglutinable rough variants, on the other hand, including those which were non-motile, "have a weak somatic antigen in common with the true smooth cholera vibrio. They are reversible and are actually the true rough variants of cholera vibrio apparently resulting from the bacteriophage action during the natural course of the disease." *W. F. H.*

CALVANO (Umberto). Il colera sperimentale nel coniglio. [**Experimental Cholera in the Rabbit.**]—*Giorn. d. Batter. e Immunol.* 1933. Aug. Vol. 11. No. 2. pp. 264–272. English summary (8 lines).

The method used was that of ORSI by injection into the gall bladder. A suspension of cholera from a 24-hour agar culture, of a strength equal to 10 loopfuls per cc. in dose of 0·1 to 0·2 cc., formed the injection material. Ten rabbits were injected, of which 5 died in 24 to 36 hours and one after 10 days. Microscopic preparations from the bile or contents of the duodenum showed vibrios in long spirals, an arrangement which was probably due to the bile, for the vibrios from the small intestine only rarely amounted to 2, 3 or 4 united elements. Control injections made with double the dose directly into the small intestine were unsuccessful, while an injection of a whole agar slope intraperitoneally produced no effect. In these experiments it has been found therefore that the injection of quite small quantities of cholera vibrios by the gall bladder route have produced all the features of human cholera in the rabbit when the injection of larger amounts into the peritoneum, the circulation or the small intestine were without effect. Such cholera infection could be produced likewise with almost avirulent old laboratory cultures. *W. F. H.*

DAMBOVICEANU (A.). Agglutination par les acides de vibrions cholériques et paracholériques. [**Acid Agglutination of Cholera and Paracholera Vibrios.**]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 21. pp. 485–487.

With the technique employed positive agglutination by the acid appeared after 1 to 2 hours at the optimum pH, that is to say at the isoelectric point of the vibrio. This agglutination gradually extended so as to include the neighbouring pH, and the iso-agglutination zone became sharply defined in 18 hours. All the cholera vibrios used, numbering 63 serologically authentic strains, were agglutinated by acids with optimum at pH 3·2 except the Pasteur Institute strain Pottevin in which the optimum was at pH 3·5. The zone of iso-agglutination varied somewhat and was 1·2 to 5, 2 to 4, 3 to 4·6 for 12·3, 30 and 15·4 per cent., of vibrios respectively. In 5·1 per cent. of the vibrios there were two optima and two zones, although the maximum agglutination always showed at pH 3·2. The paracholera vibrios could be divided into, 58 per cent. with optimum and zonal agglutination similar to those of the cholera vibrios, 20 per cent. with a totally different optimum, and 28 per cent. quite inagglutinable in the range pH 1·7 to 9·2. *W. F. H.*

GHOSH (H.), GUPTA (Benoy Kumar Sen) & BOSE (Saroj Kumar). On the Nature of Cholera Toxin and Symptoms of Cholera.—*Jl. Indian Med. Assoc.* 1933. July. Vol. 2. No. 2. pp. 443–445.

KIRIBAYASHI (Shigeru). Supplementary Report on the Biological Peculiarities of Vibrio Cholera. I. On the Differentiation of Cholera Vibrio and Cholera-like Vibrio. II. On the Development of Vibrio Cholera on Starch-Agar-Media.—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1933. May. Vol. 32. No. 5 (338). [In Japanese. With 2 coloured plates. English summary pp. 65; 66.]

KLEINE (F. K.). Zur Erinnerung an Robert Kochs Entdeckung des Cholerabazillus.—Reprinted from *Ztschr. f. ärztliche Fortbildung.* 1933. Vol. 30. No. 13. pp. 385–386.

MEDICAL ENTOMOLOGY.

JANISCH (E.). **The Influence of Temperature on the Life-History of Insects.**—*Trans. Roy. Entom. Soc. Lond.* 1932. Dec. 31. Vol. 80. pp. 137–168. [15 refs.]

During the last few years we have seen much critical work on the relation between insects and environmental factors; study has been devoted particularly to such simple physical elements as temperature and humidity. The purpose of work of this type is to explain, if possible, the enormous fluctuations in insect populations which are frequently observed. It has been known for long that temperature is of outstanding importance in relation to rate of growth and movement, also reproduction and mortality, and many have tried to find the curve which best expresses the relation of temperature to the velocity of development. The hyperbola is frequently used, but it is clear from the present paper that this is only a rough method and that it has no theoretical basis. Janisch and many others have endeavoured to use the exponential type of curve, similar to that which relates temperature to the velocity of chemical processes. In the present paper he expresses the view that a complex curve derived from the exponential type is the only one that is suitable. The reviewer is not competent to consider all the evidence, but it is not clear to him that the biological data are sufficiently exact or uniform to support the elaborate mathematical structure which is erected on them.

The author deals with many other matters of great general interest, and the paper is important because it may help to give us a better understanding of the effect of climate upon insect populations.

P. A. Buxton.

NIESCHULZ (Otto). Ueber die Bestimmung der Vorzugstemperatur von Insekten (besonders von Fliegen und Mücken). [**Determination of the Temperature preferred by Insects.**]—Reprinted from *Zool. Anzeiger.* 1933. Vol. 103. No. 1/2. pp. 21–29. With 4 figs.

The author made use of an apparatus consisting of a long metal tank, one end of which was inserted into an ice-box, the other into a chamber which was maintained at 50°C. When such an apparatus has run for a few hours, it comes into thermal equilibrium, and different parts of the long tank remain at different steady temperatures. He liberated insects into this tank, observing through its glass lid the part of it at which they chose to rest. Observations of temperature at intervals along the tank were taken at the same time. It was found that female *Stomoxys calcitrans* arrived at their " preferred temperature " in about half an hour, and that they remained between 27° and 32°C. Females of *Culex pipiens* in October, at a time when they are just going into hibernation, disposed themselves at the extreme cold end of the tank.

P. A. B.

NEVEU-LEMAIRE (M.). Les arthropodes hôtes intermédiaires des helminthes parasites de l'homme. [**Arthropods that are Intermediate Hosts of Helminths Parasitic in Man.**]—*Ann. Parasit. Humaine et Comparée.* 1933. May 1, July 1 & Sept. 1. Vol. 11. Nos. 3, 4 & 5. pp. 222–237 ; 303–319 ; 370–402. [5 pages of refs.]

The information is classified on a rather elaborate zoological basis, but the paper contains a great body of data and will certainly prove useful as a summary. It is not possible to test it for completeness except by taking a particular case, and the reviewer has studied the facts which are given about the vectors of *Wuchereria bancrofti*. Many of the records which have been published are unreliable, because they show only that wild mosquitoes of a particular species have been dissected and found to contain nematode worms which were assumed to belong to this species. The summary should state more clearly than it does that some of the records are open to this grave objection : in general the author does not make it clear whether the original paper related to infection of bred mosquitoes or dissection of those caught wild. The author has rightly included a number of mosquitoes in which the development of this parasite only proceeds to a certain point, but it would have been of value if the information about imperfect development had been fuller. There is, for instance, no reference to BAHR's discovery that the non-periodic Wuchereria of Fiji cannot develop completely in *Culex fatigans*.

The paper includes a number of old records which are now known to be erroneous ; there is no doubt that the author has decided wisely in including these and in pointing out the possible cause of the errors.

P. A. B.

POPOW (P. P.) & GOLZOWA (R. D.). Zur Kenntnis der Wasserstoffionenkonzentration im Darmkanale einiger blutsaugender Arthropoden. [**The Hydrogen Ion Concentration in the Alimentary Canal of Some Blood-Sucking Arthropods.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Oct. Vol. 37. No. 10. pp. 465–466.

The hydrogen ion concentration was determined by means of the quinhydrone electrode. No details of technique are given. The following results were obtained : *Culex pipiens* female, pH 6·87–7·05 ; *Anopheles maculipennis* female, pH 6·89 ; *Cimex lectularius*, pH 6·2 ; *Pediculus vestimenti* female (gut contents and body fluid mixed), pH 7·12–7·21 ; *Ornithodorus lahorensis* infected with relapsing fever spirochaetes, 7·39–7·60 ; the same non-infected, pH 7·72–7·80.

V. B. Wigglesworth.

STEWART (A. D.) & MOORTHY (V. N.). **Lethal Properties of Aqueous Extract of Young Bamboo Shoots.**—*Indian Med. Gaz.* 1933. June. Vol. 68. No. 6. pp. 320–323. With 1 chart.

The juice from the soft inner core of bamboo shoots 1–1½ feet in height, extracted with an equal quantity of water quickly killed guineaworm embryos, cyclops and mosquito larvae and adults. Two factors seem to be responsible for the toxic effect. (1) Free hydrocyanic acid, produced perhaps by the action of a specific enzyme upon a cyanogenic glucoside ; (ii) a substance of unknown nature which

persists after all the hydrocyanic acid has volatilized. It is hoped to apply this method of slow production of hydrogen cyanide for the control of insects in the field. *V. B. Wigglesworth.*

PARMAN (D. C.). **A Box-Type Trap to aid in the Control of Eye Gnats and Blowflies.**—*Circ. U.S. Dept. Agric. No. 247.* Wash. D.C. 1932. Nov. 4 pp. With 1 fig.

——. **Construction of the Box-Type Trap for Eye Gnats and Blowflies.**—*Mimeographed Circ. U.S. Dept. Agric. Bur. Ent., E. 299.* Wash. D.C. [1932.] 4 pp. With 4 plates. [Summarized in *Rev. Applied Entom.* Ser. B. 1933. Vol. 21. Pt. 9. p. 210.]

"In the course of investigations on the control of the eye-gnat, *Hippelates pusio*, Lw., begun in 1928, a box type of trap has been evolved that has been used successfully during two seasons in California, where this pest is extremely troublesome. It has also been adapted for trapping blow-flies and house-flies. Its main features are the following: large quantities of baits can be used to disseminate odours without requiring the hovering flies to enter the region where these are so concentrated as to be apparently more or less repellent; immature flies breeding in the baits are prevented from escaping; both chemotropic and phototropic responses can be utilised; the trap can be adapted to permit flies to enter it without entering the bait chamber; it can be constructed in sizes large enough to contain large carcasses on ranches where it is not feasible to burn dead animals, and in places where it would be advantageous to use large quantities of garbage for baits until it could be otherwise disposed of. The odours are disseminated by currents of air driven into the bait chamber through the funnel-shaped openings. Investigations also indicated that stirring the baits (especially the liquid baits used for eye-gnats) greatly increases the catch, and in 1930 a simple and inexpensive windmill bait agitator was devised. It may be possible to utilise the trap in breeding a continuous supply of parasites and predators of the flies. In the second paper detailed specifications and instructions are given for making these traps and the bait agitator. The cost of the traps is discussed.

"As the traps are intended to attract insects from a distance, they should not be placed in shut-in situations nor exposed to high winds; the most suitable positions are in open groves or thin plantings of trees or shrubs, or on ranges with a moderate low growth of vegetation or open high timber, with one of the two entrances facing away from the prevailing wind. The bait used for the eye-gnat trap was generally 1 lb. beef or pig's liver and 2 ozs. urea to 4 U.S. gals. water. The best catches were made when the bait was partly or wholly covered with water, and where enough water is used to float the baits, the windmill agitator may be employed with advantage. If parasites are not being reared, it has been found advantageous to add one teaspoonful of nicotine sulphate to each U.S. gallon of water as a larvicide."

HINMAN (E. Harold). **The Rôle of Bacteria in the Nutrition of Mosquito Larvae. The Growth-stimulating Factor.**—*Amer. Jl. Hyg.* 1933. July. Vol. 18. No. 1. pp. 224–236. [15 refs.]

The effect of bacteria upon the growth of mosquitoes belonging to the genera *Culex*, *Aëdes* and *Anopheles* has been studied over a period of four and a half years. Most of the experiments have been made with *Aëdes aegypti*. It is shown that moderate numbers of bacteria in the culture medium stimulate growth, but excessive contamination causes death. If the bacteria in an otherwise suitable culture medium are killed, whether by autoclaving, by keeping at 60°C. for 30 minutes, or

with 10 per cent. formaldehyde, the growth-stimulating factor is destroyed. Attempts to isolate this vitamin-like substance from the bacteria failed. It is not filtrable from bacterial cultures, nor could it be extracted by grinding the bacteria in aqueous media, alcohol or ether. (In a few cases, however, perfect growth was obtained in sterile media after the addition of the extract ; so it is possible that slight modification in technique might give regular results.) There is some evidence that fungi and yeasts play a similar rôle in the nutrition of mosquito larvae: *V. B. Wigglesworth.*

SHUTE (P. G.). **A Simple Method of obtaining Eggs of Mosquitoes.**—*Ann. Trop. Med. & Parasit.* 1933. Oct. 21. Vol. 27. No. 3. pp. 469–470.

Eggs of mosquitoes may frequently be obtained by confining a wild female in a small cage with water and raisins, but sometimes this is not successful. The author has no difficulty in obtaining eggs, and in getting them at the moment when he wants them, by stunning the female and putting her on the surface of water in a watch glass. As she recovers from this assault, she generally lays a large number of eggs.

P. A. B.

HAMLYN-HARRIS (R.). **Some Ecological Factors involved in the Dispersal of Mosquitos in Queensland.**—*Bull. Entom. Res.* 1933. July. Vol. 24. Pt. 2. pp. 229–232. With 1 plate.

The chief problem that is here discussed is the presence of abundant mosquitoes in parts of Queensland apparently devoid of water. Several factors are concerned. (i) Migration from breeding places elsewhere. This is notably the case with *Aëdes vigilax* which breeds in enormous numbers in brackish or salt water pools on the coast and is carried inland for distances up to sixty miles by north-westerly winds. These migrations occur only when the atmospheric humidity is high ; indeed, in summer the appearance of large numbers of *A. vigilax* inland heralds the approach of a storm. The same remarks apply to *Mucidus alternans*, though the predaceous larvae of this species are not restricted to salt water. (ii) The existence of breeding places in tree holes, etc., which are overlooked by the casual observer. This is the case with *Aëdes notoscriptus* which may be very prolific in apparently waterless regions. (iii) Extreme localization of mosquitoes, breeding, during the dry season, in small residual collections of water liable to be overlooked. *V. B. Wigglesworth.*

HINMAN (E. Harold). **Enzymes in the Digestive Tract of Mosquito Larvae.**—Reprinted from *Ann. Entom. Soc. of America.* 1933. Mar. Vol. 26. No. 1. pp. 45–52. [16 refs.]

The digestive enzymes in the alimentary canal of the larvae of *Aëdes aegypti* and *Culex quinquefasciatus* consist of an amylase, an invertase, an enzyme that hydrolyses xylose, and a protease acting in an alkaline medium. *V. B. Wigglesworth.*

UNITED STATES NAVAL MEDICAL BULLETIN. 1933. July. Vol. 31. No. 3. pp. 323–334.—**Mosquito Control in Haiti.**

An admirable and stimulating report describing work done in the vicinity of Port au Prince, by the American Scientific Mission to Haiti, during the fiscal year 1931–32.

By " oiling latrines and controlling vast areas in and near the city," malaria-carrying and troublesome mosquitoes have been " noticeably reduced," and as a result an expected outbreak of malaria in one section of the city did not take place. The extent and growth of the work are suggested by the increased quantities of mosquito oil and Paris green used in this period.

For the control of mosquito breeding in pit latrines, into which water enters, a spray consisting of " a mixture of 5 per cent. crude cresol, 10 per cent. kerosene, and 85 per cent. Diesel engine oil " proved most suitable. The so-called " Panama Whale," made of native rope with a 30-lb. weight in the front end, and saturated with oil, smooths, grooves and oils simultaneously, and is of much help in controlling open ditches, all of which in or near the city are thus treated once a week. Contrary to common belief, but agreeably with the present reviewer's experience, tadpoles were found not to prey on mosquito larvae. Much attention was naturally paid to drainage, and the divers forms of drain, both surface and subsurface, used in various conditions of locality and soil, are described and contrasted. So far as possible, especially within the city boundaries, the closed subsurface drain, at least 30 inches below ground and with a minimum pitch of 0·5 per cent., was employed.

Brief notes are given on fourteen species of mosquito met with in or near Port au Prince, where *Aëdes aegypti*, carrier of yellow fever and dengue, was found breeding in pit latrines. *Anopheles albimanus*, a dangerous vector of malaria and the only known carrier of the disease in Haiti, is common below 2,500 ft., but does not breed in dense shade. *Aëdes sollicitans*—not a disease carrier but a " great nuisance "—breeds in saline shore-pools, and often occurs in swarms which, like those of *A. taeniorhynchus*, " may travel inland for 40 miles or more." Thus the experience of W. H. W. Komp in the Panama Canal Zone, that any mosquito which attacks man " will, if produced in excessive numbers, fly much farther than is normally considered the flight range of that particular mosquito " in order to feed, has been confirmed in Haiti.

E. E. Austen.

Vanni (Vittorio). Ancora un progresso nella delarvizzazione dei Culicidi. (**Advance in the Larval Control of Culicidae.**)—*Riv. di Malariologia.* 1933. May–June. Vol. 12. No. 3. pp. 532–534. With 1 fig. English summary (6 lines) p. 653.

This is an interesting paper. After a few introductory remarks on the usual diluents or admixtures such as road dust with Paris green, the author describes the effects of a powder obtained after distillation of bituminous schists at low temperature. It is of a brown colour, slightly oily to the touch, in fact it contains an oily residue from the distillation. When thrown on water it forms a very thin film which, if the water is undisturbed, persists for some weeks, and the interspaces between the particles of the powder become occupied by minute fatty or oily droplets. Even after heavy rain very little of the powder falls to the bottom, and if the force be enough to break the film it very soon re-forms.

As regards its effects on mosquito larvae, those of Anopheles die more rapidly than those of Culex, though it is very effective with the latter also and impedes emergence from the pupae. The mechanical effect of the powder alone is great, but this can be enhanced by the

additional toxic effects of Paris green, if desired. [Unfortunately the author does not state whether it has any trade name, nor does he mention the price nor whence it can be obtained.] *H. H. S.*

FERMI (Claudio). Diserbo biologico delle acque. (**Biological Clearing of Ponds.**)—*Riv. di Malariologia.* 1933. May–June. Vol. 12. No. 3. pp. 523–531. English summary (6 lines) p. 653.

The claims of the carp are brought forward as far surpassing those of Gambusia as a mosquito larvivore. As evidence the experiment carried out at the Barratz pond or marsh of 60 hectares extent in the north-west of Sardinia is related.

In October 1925 Gambusia were introduced and again in the spring of the following year. Although they multiplied well, they proved ineffectual as regards the larvae, because the vegetation consisted largely of *Spirogyra* and *Zannichelia palustris* and was so dense that even small boats could not penetrate it. In May, 1926, six thousand carp (Galician species) were introduced, and, to the wonderment of the fishermen and other local inhabitants, destroyed the whole of the vegetation, the moorhens previously present in countless numbers disappeared for lack of food, and a close search "failed to detect a single culicide larva." *H. H. S.*

HOUDEMER (E.). Observations sur quelques poissons dulcaquicoles culiciphages du Tonkin. [**Observations on Freshwater Culiciphage Fish of Tonking.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1932. Oct. Vol. 10. No. 7. pp. 740–746.

The author advises the use in Tonking of *Anabas scandens* and *Macropodus viridiauratus* for destruction of larvae. The fish which devour larvae in an aquarium are the following in order of efficiency :—

1. *Anabas scandens*, Daldorf ;
2. *Macropodus viridiauratus*, L. (= *M. opercularis*, L.) ;
3. *Carassius auratus*, L. ;
4. *Rasborinus lineatus*, Pellegrin ;
5. *Toxabramis Houdemeri*, Pellegrin, 1932 ;
6. *Culter brevicauda*, Gunth ;
7. *Barbus hainani*, Lehberger, 1929.

The determinations were made in each case by Dr. PELLEGRIN of Paris. *Anabas scandens*, the climbing perch, is extremely voracious ; their flesh is much esteemed and they reach a weight of 50 gm. ; they live in water containing little oxygen. *M. viridiauratus*, the paradise fish, is a good feeder. It is too quarrelsome to put in collections of water with other fish. The well-known *C. auratus* increases at a surprising rate, 1,300 weighing 6 kgm. placed in a rice field of an area of one hectare gave 5 months later a total weight of 120 kgm.

The enemies of these fish are discussed and it is noted that the metacercariae which infest their scales should be studied in case they form part of the life cycle of *Clonorchis sinensis*.

[*Carassius auratus* is a well-known host of *C. sinensis* and FAUST has shown that cysts from fishes of the families *Percidae*, *Centarchidae* and *Umbridae* will infect dogs and cats.] *A. G. B.*

LEWIS (D. J.). **Observations on *Aëdes aegypti*, L. (Dipt. Culic.) under Controlled Atmospheric Conditions.**—*Bull. Entom. Res.* 1933. Sept. Vol. 24. Pt. 3. pp. 363–372. With 5 figs. [13 refs.]

The author describes methods of breeding and manipulating adult and early stages of mosquitoes: many of them are ingenious and labour-saving. The mosquito, *Aëdes aegypti*, does not possess an efficient mechanism for reducing loss of water if it is kept in dry air. The length of life is therefore much less in dry air than in moist, though it is not directly proportional to the saturation deficiency. Mosquitoes which are kept so that they can drink water live materially longer than those which are kept in saturated air without the possibility of drinking. This observation remains unexplained and is curious, because one would suppose that in saturated air the insect could not lose water and must therefore die when it has exhausted some other substance. The paper includes a considerable body of fact relating to the duration of life of individuals of both sexes, fed and unfed, exposed to a number of different temperatures and humidities. The figures relating to survival in dry air at rather high temperatures are interesting in relation to the work of BEEUWKES, KERR, WEATHERSBEE, TAYLOR (this *Bulletin*, Vol. 30, p. 350).

A piece of apparatus is described within which mosquitoes can be applied to the skin. Air of controlled humidity is circulated slowly through the apparatus so that evaporation from the skin does not sensibly affect the humidity. With this the author shows that the yellow fever mosquito bites most readily at temperatures between 25° and 30°C. At 20°C. and below it, and also at 35°C. and above it, the insects fed less readily. Within the optimal zone of temperature they feed more freely if the air is nearly saturated than if it is drier, but a small proportion fed (4 out of 36) at 30°C. and 0 per cent. humidity, that is to say, under conditions of desiccation which are greater than any prevailing within the natural range of the species. The insect's willingness to take blood is partly determined by climatic conditions, but partly also by the size of the container. The author records that if mosquitoes are confined in a very small tube and held close to the skin a much larger proportion feed than if they are kept in the apparatus which he normally used. *P. A. B.*

MERTENS (W. K.). Muggenbroedplaatsen in de directe omgeving van enkele woonwijken te Batavia in verband met dengue. [**Mosquito-Breeding Places in Residential Districts of Batavia in Relation to Dengue.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1933. Aug. 29. Vol. 73. No. 18. pp. 1096–1106. With 1 fig.

This article presents the results of a survey of mosquito breeding places and considers the possibility of effectively dealing with them as a prophylactic measure against dengue, not to mention filariasis and even yellow fever. Dengue although not a fatal disease is in some districts a scourge and a cause of considerable loss of working time. The anti-mosquito measures are of the well known type. One suggestion especially is, however, worth considering which is to make the discovery of mosquito larvae a punishable offence on the part of the owner of the property, more particularly the finding of well grown larvae and still

more of pupae.* The fine to be levied on the delinquent would be made progressively larger with repetition of the offence. *W. F. Harvey.*

EDWARDS (F. W.); PATTON (W. S.). **The Identity of *Culex aegypti*, L.**—*Ann. Trop. Med. & Parasit.* 1933. July 7. Vol. 27. No. 2. pp. 357–360.

A reasoned argument, for the confuting of PATTON [this *Bulletin*, Vol. 30, p. 614], is given by Edwards in support of his contention that the quondam *Aëdes* (*Stegomyia*) *fasciata* is the mosquito described as *Culex aegypti* (1762) by Linnaeus, whose trivial name should therefore henceforth be adopted for the yellow fever mosquito. In the present reviewer's opinion, at any rate, the author succeeds in establishing his case, although he fails to insist on what is perhaps the most cogent piece of evidence of all, namely that since Linnaeus clearly uses "corpus" in the sense of "abdomen," his "puncta candida . . . in corpore . . . longitudinaliter sita" cannot possibly, as supposed by PATTON, refer to the markings on the sides of the thorax.

PATTON, in the spirit of the remark, widely known though entirely apocryphal, attributed to the Italian astronomer, sticks to his opinion that the name *aegypti* should be dropped. *E. E. A.*

RILEY (William A.) & LIANG-YU (Wu). **The Anopheline Mosquitoes of China.**—Reprinted from *Lingnan Sci. Jl.* 1932. Apr. Vol. 11. No. 2. pp. 175–191. With 13 figs. [24 refs.]

Although, according to the authors, in the whole gamut of disease in China malaria is second in importance only to tuberculosis, existing knowledge of Chinese anophelines is hopelessly inadequate. Lists of species collected round about Peiping, Canton and Hong Kong are available, but these form but a beginning, and mosquito literature in general is not only vast but scattered, and largely inaccessible to the Chinese student. As a preliminary contribution to the more intensive work which is urgently required, the present paper should prove of real value. It includes a "Key to Mosquitoes of the Genus Anopheles Reported for China or Indo-China"; useful and practical "Hints for Collectors"; and a Bibliography. The need for accurate identification of species, and a close study of their bionomy and ecology before embarking on an anti-mosquito campaign is emphasized. *E. E. A.*

i. TOUMANOFF (C.). Sur le peuplement anophélien du bassin du Fleuve-Rouge au Tonkin. [**The Anopheline Population of the Basin of the Red River, in Tonking.**]—*Bull. Soc. Path. Exot.* 1933. May 10. Vol. 26. No. 5. pp. 741–747.

ii. TOUMANOFF (C.). Recherches sur la fréquence saisonnière de diverses espèces anophéliennes au Tonkin (Bassin du Fleuve Rouge). Première note: *A.* (*Myz.*) *minimus* Théo. et *A.* (*Myz.*) *aconitus* Dön. Deuxième note: *A.* (*Pseudomyzomyia*) *vagus* Dön. [**Seasonal Frequency of Various Species of Anophelines in Tonking (Red River Basin).**]—*Bull. Soc. Path. Exot.* 1933. June 14. Vol. 26. No. 6. pp. 857–863. With 1 diagram. pp. 863–867. With 2 diagrams.

i. Statistics are given based on two years' investigations into the anopheline fauna of the Red River basin in Tonking, and derived from

* This practice is not unknown in British Colonies; *e.g.*, in Freetown, Sierra Leone, in 1931 there were inspected 131,277 compounds. Mosquito larvae were found in 574 and the occupiers prosecuted. 549 were convicted and fines totalling £109. 6s. were imposed.—Ed.

the examination of a total catch of 26,858 larvae and 13,992 adults. The commonest species were found to be *Anopheles vagus* and *A. hyrcanus* var. *sinensis*. A significant fact is the very high proportion of the principal malaria carriers, especially *A. minimus*, in the middle and upper regions of Tonking, which are the most fever-stricken.

ii. It is pointed out that the seasonal abundance of the different anophelines is a matter of great practical importance ; species normally zoophile, and of little account as vectors of malaria, may yet take part in transmission and bring about sudden epidemics, if in excessive numbers at certain seasons. The richness of the Far Eastern anopheline fauna necessitates great caution in incriminating species as malaria carriers; and even when one or another kind of Anopheles has been found to be infected, knowledge of seasonal frequency will show whether such aptitude for transmission is constant or merely temporary.

In the case of *A. minimus*, the principal malaria vector in Tonking, seasonal frequency was studied for two years in three areas in the Red River basin, in which the anopheline fauna is similar, and this species is constantly present. As a result, *A. minimus* was found to be most abundant from November to March, that is during the winter monsoon. The reasons for its diminution during the rains are discussed. For *A. aconitus*, November and December would appear to be the period of maximum frequency, at least in the larval stage. *A. vagus*, which, as stated above, is one of the commonest species of its genus in Tonking, was most prevalent in both larval and adult stages in August and September, part of the rainy season when temperature is variable. Breeding chiefly in pools of stagnant water, this mosquito adapts itself to temporary accumulations due to rain, while the temperature from May to August accelerates development by curtailing the duration of the larval stages. *E. E. A.*

GIBBINS (E. G.). **Eggs of Some Ethiopian** *Anopheles* **Mosquitos.**—*Bull. Entom. Res.* 1933. July. Vol. 24. Pt. 2. pp. 257–262. With 10 figs.

Up to the present, the eggs of most of the African species of Anopheles have been undescribed. In the present paper the eggs of ten of them are described and figured, and the author's observations are compared with previous descriptions when available.

The paper is of some general interest, because any detailed morphological work may throw light on the inter-relationships of *Anopheles* of the *funestus* group. Several members of this group are of great importance in relation to malaria, and at present it is a matter of great difficulty to distinguish between them. The group that centres round *A. marshalli* also presents systematic problems of unusual difficulty. It is interesting to notice that some differences have been observed, even between the eggs laid by a single female of this species. The reviewer understands that the collecting of eggs of Anopheles in nature is now commonly practised by malariologists in South Europe, as they find it easier to identify eggs than larvae. Possibly, if work of this sort is pushed forward, it may be used in the same way in Africa.

P. A. B.

GIBBINS (E. G.). **The Domestic *Anopheles* Mosquitoes of Uganda.**—*Ann. Trop. Med. & Parasit.* 1933. Apr. 10. Vol. 27. No. 1. pp. 15–25. [10 refs.]

In the review of this paper (this *Bulletin*, Vol. 30, p. 608), it is wrongly stated that *A. mauritianus* var. *ziemanni* showed an infection rate of 0·3 to 0·5 per cent. This species was *not* incriminated in the natural transmission of malaria. *V. B. Wigglesworth.*

TRENSZ (F.). Etude expérimentale sur la fonction des chambres à air de l'oeuf d'*Anopheles maculipennis*. [**Function of the Air Chambers of the Egg of** *A. maculipennis*.]—*Arch. Inst. Pasteur d'Algérie.* 1933. June. Vol. 11. No. 2. pp. 192–197. With 1 plate. [13 refs.]

Experiments made with *A. maculipennis* in Algeria lead the author to the conclusion that the air chambers of the eggs function as balancers and not as floats. It is the surface tension that buoys up the eggs.

A. G. B.

DMITRIEV (I. D.) & ARTEMIEV (A. I.). [**On the Viability of the Aquatic Stages of** *Anopheles*.]—*Med. Parasit. & Parasitic Dis.* Moscow. [1933]. Vol. 1. Nos. 5–6. pp. 259–261. [In Russian.]

Working in the Caucasus, the authors made observations on the viability of the aquatic stages of *Anopheles maculipennis*. In one case the relative numbers of larvae of different stages were estimated by taking fifty samples every ten days in the course of a summer from four natural water reservoirs. Instead of the expected predominance of later stages of the larvae as the observations progressed, it was found that, on the contrary, the later the stage of the larvae the smaller their number. Estimates showed that of the larvae of the 1st instar only 67 per cent. survived to the 2nd instar, 40 to the 3rd, and 25 to the 4th. This question was afterwards studied experimentally on the progeny of 20 females. The eggs were in each case laid in Petri-dishes with water. Out of 3,278 eggs, 2,090 (63·8 per cent.) larvae were hatched. Further observations were made in artificial pits connected with an irrigation canal, the temperature and pH of the water being daily recorded. Into each pit were placed from 500 to 1,000 eggs and as soon as pupae made their appearance the pits were covered with gauze and the emerging adults were daily caught and counted. Out of the total number of 3,750 eggs placed in the pits only 685 (15·6 per cent.) reached the adult stage, the survival of various stages per 100 eggs being as follows: larvae 1st instar 63·8; 2nd 42·7; 3rd 25·5; 4th 15·9; adults 15·6. *C. A. Hoare.*

NABOKOFF (V.), GORJAINOFF (A.) & BEKMAN (A). Arsmal (arsenite de cuivre) nouvelle preparation pour la lutte contre les larves d'anophele. [**Arsenite of Copper for Antilarval Use.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1933. Vol. 2. Nos. 1–2. pp. 59–65. [In Russian.]

Experimenting with various chemicals at the Toxicological Department of the Moscow Tropical Institute, the authors tested the effect of copper arsenite ($CuHAsO_3$) upon the larvae of anopheline mosquitoes. Both laboratory and field tests showed that practically 100 per cent. of the larvae can be destroyed by employing preparations of copper

arsenite with an arsenic content not below 9 per cent., in doses of 1 kilogram per 1 hectare of surface. The preparation is used in the form of a powder mixed with 9 parts of peat dust, and is sprayed either by means of a hand pulverizer or from an aeroplane. Apart from its superior larvicidal properties "Arsmal" is said to be cheap to produce. [Arsmal is evidently akin to, if not identical with, Paris green.]

C. A. Hoare.

SALITERNIK (Z.). **The Breeding of *Anopheles mauritianus* in Palestine.** —*Bull. Entom. Res.* 1933. Sept. Vol. 24. Pt. 3. pp. 343–344.

From July to September, 1932, larvae of *A. mauritianus* "always in association with *A. hyrcanus*," were found by the author in small overgrown pools adjoining the Kurdani River, near Acre. The chemical composition of the water is given, and it is stated that *A. mauritianus* a doubtful malaria-carrier in nature, is not a house-haunter.

[*A. mauritianus* was among six species of *Anopheles* found by the present reviewer, in the summer of 1918, breeding in the R. Auja region of Palestine, some 55 miles south-west of the locality referred to above: *cf.* AUSTEN, *Trans. Soc. Trop. Med. and Hyg.*, 1919, Vol. 13, p. 55—a record which has been overlooked by subsequent writers.]

E. E. A.

ROUBAUD (E.) & COLAS-BELCOUR (J.). Observations sur la biologie de l'*Anopheles plumbeus*. II.—L'asthénobiose cyclique hivernale. [**Observations on the Biology of *Anopheles plumbeus*. II. Cyclic Hibernal Asthenobiosis.**]—*Bull. Soc. Path. Exot.* 1933. July 12. Vol. 26. No. 7. pp. 965–972. [13 refs.]

The tree-hole breeding *Anopheles plumbeus*, which usually winters as a larva (this *Bulletin*, Vol. 29, p. 835), exhibits at this season a notable slowing-down of development. This diapause or asthenobiosis is not dependent upon temperature, but is a spontaneous process cyclically recurring in the life of the species. In the course of experiments by the authors, the minimal duration of larval life in May and June was from 22 to 29 days; on the other hand, under the same conditions of temperature and food, larvae hatched from a batch of eggs laid on 6th September took from 135 to 271 days to reach the pupal stage. Larval life therefore, without any change in temperature or environment, spontaneously becomes from six to nine times longer in winter than in summer. The development of hibernating larvae in a condition of asthenobiosis, which may set in at any stage, cannot be accelerated by warmth, while exposure to higher temperatures (77–82°F.) results in death in the second or third stage. Neither light nor food have any effect and, at the close of winter, development is resumed only after a long period of repose at a low or fairly low temperature. Whether hibernal asthenobiosis is exhibited by *A. plumbeus* throughout its range, or is racial in character, cannot yet be determined. *E. E. A.*

GATER (B. A. R.). **Notes on Malayan Mosquitoes, IV. Anopheline Larvae of the "*Umbrosus* Group."**—*Malayan Med. Jl.* 1933. Sept. Vol. 8. No. 3. pp. 180–189. With 24 figs. [25 refs.]

Among the twenty-nine species of Anopheles known to occur in the Malay Peninsula (this *Bulletin*, Vol. 30, p. 607), there are six in which

the branches of the abdominal palmate hairs of the larva, instead of being flattened, are filamentous, forming so-called "cockades." The species which exhibit this abnormality are :—*Anopheles brevipalpis*, *A. hunteri*, *A. baezai*, *A. separatus*, *A. similissimus* and *A. umbrosus*. Although this grouping is more or less artificial, some of these species are distinguishable with difficulty, either as larvae or adults, and have not infrequently been mistaken for *A. umbrosus*. In addition to a key, this paper gives in some detail the diagnostic larval characters of five of the species concerned. *E. E. A.*

MARTINI (E.), MAYER (F.) & WEYER (F.). Ueber die Durchwinterung unserer *Anopheles maculipennis*. [**The Overwintering of** *Anopheles maculipennis* **in Germany**.]—*Riv. di Malariologia*. 1932. Nov.–Dec. Vol. 11. No. 6. pp. 753–784. With 3 charts. [Refs. in footnotes.] English summary p. 940.

Anopheles maculipennis passes the winter in the adult (fertilized female) state, either (var. *labranchiae*) in outbuildings containing live-stock, or (var. *messeae*) in cellars, barns, lofts and similar places not so occupied and therefore colder. In the former case hibernation is incomplete, and at intervals a meal of blood is taken ; in the latter the insects are rigid and motionless, and do not feed during their winter rest. The segregation of the two races, as observed by the Dutch investigators, is thus confirmed. While intermediate conditions, and even exceptions due to local influences are met with, the causes of these distinctions are to be sought in the existence of varieties or races of the species, as demonstrated in Holland and Italy.

The present lengthy addition to the ever-increasing number of papers concerning the racial question in *A. maculipennis* deals with the mode of overwintering in North Germany (Emden, Cuxhaven and Schwerin regions), displayed respectively by what appear to correspond to the Italian vars. *labranchiae* (with short wings and dappled grey eggs) and *messeae*, which has long wings and lays banded eggs. In the case of the latter variety oviposition ceases, and the change to the hibernating condition takes place, in September ; in the former, in the region of Emden, egg-laying markedly diminishes in the first half of August, and may entirely cease by the middle of the following month.

The difference between the races in the manner of overwintering is not of a profoundly physiological character, but consists in the inclination of the one which lays dappled grey eggs to seek out, in order to pass the winter, places different from those selected by the other race ; naturally these are not the same as the summer retreats, but have a different "micro-climate." On the conclusion of hibernation there is a definite contrast between the races ; in the one which lays dappled grey eggs the change to an active condition is usually gradual, in the other it takes place suddenly. After hibernation, in the area covered by the observations described, readiness for oviposition occurs in the race which deposits banded eggs about four weeks later than in the other, though in this connexion meteorological conditions naturally have great effect. The authors consider that their results definitely confirm the theory, advanced by DE BUCK, SWELLENGREBEL, VAN THIEL and others, that the differences in the overwintering of *A. maculipennis* are due to the diverse behaviour of the two races.

A method of determining the winter cholin content of *A. maculipennis*, which averages 0·67 per cent., is described. *E. E. A.*

WEYER (F.). Grösse und Maxillenzahnzahl als Unterscheidungsmerkmal der Rassen von *Anopheles maculipennis* und ihre Beziehungen zur Umwelt. (**Size and Maxillary Index as Differential Characters of the "Anopheles maculipennis" Races. Their Relation to Milieu.**)—*Riv. di Malariologia.* 1933. May-June. Vol. 12. No. 3. pp. 487–520. With 18 graphs. English summary (9 lines) p. 652.

"Between the German anopheline races of *atroparvus* and *messeae* we observe little but constant differences in the maxillary index. The size of these races—especially that of their wings—undergoes variations in the same locality not only in the course of a year, but also in successive years. Sometimes *atroparvus* has longer wings than *messeae*.

"These variations seem to depend on the influences of milieu (climate, breeding places). Then they are not to be considered as genotypical characters. The size appears to have no practical differential value. As far as the reaction to milieu is concerned, *atroparvus* shows a greater adaptation power."

RAYNAL (J.) & LE GAC (P.). Etude sur plusieurs lots de phlébotomes capturés dans différents quartiers de Marseille. [**Phlebotomus of Marseilles.**]—*Ann. Parasit. Humaine et Comparée.* 1933. July 1. Vol. 11. No. 4. pp. 249–267. With 1 map.

A collection of 602 adult Phlebotomus made in and around Marseilles between July and September 1932 comprised 585 *P. perniciosus*, 16 *P. papatasi* and 1 *P. larroussei*. Both the former species attack man, but whereas *P. papatasi* was always found resting during the day inside houses, *P. perniciosus* was always in stables, outhouses, etc. The high proportion of the latter species taken is interesting in view of the fact that it is the presumptive carrier of Mediterranean kala azar, many cases of which are reported every year from Marseilles. The taxonomic differences between the species mentioned are described in great detail.

V. B. Wigglesworth.

HASE (Albrecht). Ueber heftige, blasige Hautreaktionen nach Culicoides-Stichen. [**Severe Vesicular Skin Reactions after Culicoides Bites.**]—*Ztschr. f. Parasitenk.* 1933. Sept. 6. Vol. 6. No. 1. pp. 119–128. With 2 text figs. [29 refs.]

Our knowledge of the effect of insect bites upon man has been greatly increased in the last ten or fifteen years. The problem has been approached from the zoological and also from the medical side, and recent advances in the study of immunity have provided valuable experimental methods. In the present work the author presents detailed observations of a patient who was bitten by midges (Culicoides). He describes the successive stages in the development of a large vesicular lesion. The view is expressed that lesions of this type are probably always caused by the bites of Culicoides, though they are frequently attributed to mosquitoes. *P. A. B.*

GIBBINS (E. G.). **Studies on Ethiopian Simuliidae.** *Simulium damnosum*, **Theo.**—Reprinted from *Trans. Roy. Entom. Soc. London.* 1933. June 30. Vol. 81. Pt. 1. pp. 37–51. With 27 figs. & 1 plate.

The exceedingly blood-thirsty and appropriately named little fly known as *Simulium damnosum* is here described in all its stages, and from both sexes of the adult, from material obtained at Jinja, Uganda,

where the typical specimens of the species were collected by CHRISTY some thirty years ago. In view of CHRISTY's statements as to the abundance of *S. damnosum* at certain seasons (a belt of the insect 12 or 15 miles or more in length, and 3 or 4 miles wide, along the right bank of the Nile)—statements which probably fall far short of the truth—Gibbins, who was impeded in his search by the strength of the current and by the presence of crocodiles, evidently failed to find the main breeding-place. It is noted that the insect breeds only in the most turbulent and most highly aerated parts of the river, and that the adults seem to be capable of flying thirty miles. Contrary to the habit of the British *S. reptans*, which usually bites the forehead, *S. damnosum* seems by preference to attack the lower extremities. [At Brazzaville on one occasion ROUBAUD found the fly in swarms round the legs of sleeping sickness patients.] *S. damnosum*, which is believed to occur throughout Equatorial and in many parts of subtropical Africa, has already been found by BLACKLOCK, and also by BEQUAERT, to be a carrier of *Onchocerca volvulus*. *E. E. A.*

LAAKE (E. W.), PARMAN (D. C.), BISHOPP (F. C.) & ROARK (R. C.). **The Chemotropic Responses of the House Fly, the Green-Bottle Flies, and the Black Blowfly.**—*U.S. Dept. of Agric. Washington. Technical Bull. No. 270.* 1931. Nov. 10 pp.

Many chemicals have been tested as attractants or repellants for *Musca domestica*, *Lucilia* spp., and *Phormia regina* in the presence of raw meat. Pine tar oils are the most effective repellents and have been recommended as a dressing for the protection of wounds on animals from the screw worm fly (*Chrysomyia macellaria*). Clove oil and clove powder are moderately effective repellents, and mixed with vegetable oils and applied over the surface of fresh meat, they have proved useful in protecting this from flies at camps. Geraniol, bromoform and some other substances increased the attractiveness of meat, but there were considerable differences as between the different species of flies.

V. B. Wigglesworth.

NIESCHULZ (Otto). **Some Remarks about the Rôle of True Blood-sucking *Musca* Species as Transmitters of Diseases.**—*Ann. Trop. Med. & Parasit.* 1933. July 7. Vol. 27. No. 2. pp. 213–214.

In view of a statement by PATTON that nothing is known of the capabilities of true blood-sucking species of Musca as transmitters of pathogenic organisms the author gives a brief review showing that *M. crassirostris* has proved to be capable experimentally of transmitting surra, anthrax and haemorrhagic septicaemia of buffaloes.

A. G. B.

MALLOCH (J. R.). **Exotic Muscaridae (Diptera).**—*Ann. & Mg. Nat. Hist.* 1932. Apr., May & June. Ser. 10. Vol. 9. pp. 377–405; 421–447; 501–518. With 27 figs. [Refs. in footnotes.]

The author gives a systematic review of the species of the genus *Stomoxys*, together with *Haematobia*, *Bdellolarynx*, etc. In view of the possible importance of Stomoxys as a vector of trypanosomiasis in several parts of Africa, this systematic work may be of value to medical men. It is clear that it will be of great service to veterinarians.

P. A. B.

LEWIS (E. Aneurin). **Observations on Some Diptera and Myiasis in Kenya Colony.**—*Bull. Entom. Res.* 1933. July. Vol. 24. Pt. 2. pp. 263–269. [13 refs.]

This paper comprises historical notes and preliminary observations on Diptera causing myiasis in animals and man in Kenya Colony. Wounds, ulcers and sores in natives are often infested with maggots, the responsible species recognized so far being *Chrysomyia bezziana* and *Sarcophaga haemorrhoidalis*. Infestation of the healthy skin by the tumbu fly, *Cordylobia anthropophaga*, is common throughout the Colony. *V. B. Wigglesworth.*

BRUMPT (E.). Les myiases chirurgicales. [**Myiasis in Surgery.**]—*Bull. Acad. Méd.* 1933. June 27. 97th Year. 3rd Ser. Vol. 109. No. 25. pp. 891–899. [15 refs.]

——. Utilisation des larves de certaines mouches pour le traitement de l'ostéomyélite et de diverses affections chirurgicales chroniques. —*Ann. Parasit. Humaine et Comparée.* 1933. Sept. 1. Vol. 11. No. 5. pp. 403–420. With 1 text fig. & 6 figs. on 2 plates. [3 pages of refs.]

These papers include a history of observations on the effects of maggots in wounds, and a description of the technique for rearing and applying sterile maggots in the treatment of chronic osteomyelitis. Ambroise PARÉ in 1579 described the invasion of a head wound by maggots, but from his description, which is here printed in full, he did not recognize any beneficial action by the larvae. LARREY, during the campaign in Egypt in 1803, noted that wounds invaded by maggots healed more rapidly, and KEEN during the American Civil War (1860) actually used larvae successfully in the treatment of suppurating wounds. The beneficial effect of maggots was noted by various observers during the late war and led BAER to develop his method of treating chronic osteomyelitis by their use. Brumpt here describes in detail the method of sterilizing (with 10 per cent. formol) the eggs of *Lucilia sericata*, of rearing the larvae (in "bacto-liver") under sterile conditions, and of applying the larvae (48 hours old, 200 to 1,000 at a time) to the wound. Sometimes as many as seven applications are necessary before the entire wound is lined with healthy granulation tissue. He reports very favourably on the treatment and recommends its general adoption, but emphasizes the need for co-operation with the surgeon, particularly in the removal of sequestra which are not affected by the larvae. In spite of the obvious benefit of the larvae, the precise mechanism of their action is still uncertain; suggested factors are the presence of the proteolytic enzymes discharged by the larvae, the mechanical irritation of the spines on their bodies, and a bactericidal principle liberated by them. These questions demand further research.

V. B. Wigglesworth.

GRANTHAM-HILL (C.). **Preliminary Note on the Treatment of Infected Wounds with the Larva of** *Wohlfartia nuba.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1933. June 29. Vol. 27. No. 1. pp. 93–98. With 1 plate. [16 refs.]

Thanks largely to workers in America, it is now realized that the presence of maggots in wounds is not always harmful. It is frequently

helpful under certain conditions. The introduction of larvae of Lucilia, etc., into chronic wounds and ulcers has considerable therapeutic value.

The author observed that dirty superficial wounds on man and camels frequently contained maggots, and that when they did so they granulated healthily. He therefore made use of larvae born and bred aseptically for the treatment of various chronic surgical conditions. The presence of larvae stimulated a flood of exudate and was followed by the disappearance of slough and the rapid growth of granulation tissue. It was found necessary to arrange the dressings on the wound in such a way that, though the larvae were unable to escape, some light reached them. They were kept on the wound for two days, which was approximately the total duration of larval life. It is noted that the patients complained of tickling, and that larvae occasionally escaped into the beds.

We are becoming familiar with the therapeutic use of larvae of Lucilia and other saprophagous organisms. It is interesting to see that *Wohlfartia nuba* can be used in the same way, for other members of the same genus, for instance *W. magnifica* in South Russia and the Mediterranean, cause grave and often fatal myiasis. The therapeutic use of maggots is rapidly becoming common. Clinical workers would do well to familiarise themselves with the work of HOBSON,* who made full biochemical studies on the digestive enzymes of the larva of *Lucilia sericata*, and described relatively simple methods of rearing them aseptically. *P. A. B.*

DUNN (Lawrence H.). **Rearing the Larvae of** *Dermatobia hominis* **Linn., in Man.**—Reprinted from *Psyche*. 1930. Vol. 37. No. 4. pp. 327–342. With 1 fig. & 1 plate.

The tropical American warble-fly *Dermatobia hominis*, a parasite of cattle, monkeys and dogs in addition to man, is a frequent cause of subcutaneous myiasis in human beings, while its remarkable habit of impressing mosquitoes and other Diptera to disseminate its eggs is a curiosity of natural history. In pursuit of knowledge, the author of this paper allowed no fewer than six of the spiny larvae of this troublesome insect to grow to maturity beneath his skin. Infestation took place on October 9th, 1929 ; two newly hatched maggots, placed by Dunn on the flexor surface of his left forearm, soon commenced to burrow, and were completely hidden beneath the skin in 42 minutes and 1 hour 35 minutes respectively. In thus causing himself to become infested the author's action was supererogatory, since on the same day he had been naturally parasitized in the right arm and leg by four other larvae of *D. hominis*. All six larvae completed their development without change of place ; the first of them to emerge did so on the 49th, the last on the 55th day following infestation. Their behaviour, and the effects of their presence upon their host are recorded from day to day. Although the invasion of four of the larvae had passed unnoticed, while that of the other two was practically painless, the

* HOBSON (R. P.). Studies on the Nutrition of Blow-fly Larvae. I. Structure and Function of the Alimentary Tract.—*Jl. Experim. Biol.* 1931. Vol. 8. pp. 109–123. II. Rôle of the Intestinal Flora in Digestion.—*Ibid.* 1932. Vol. 9. pp. 128–138. III. The Liquefaction of Muscle.—*Ibid.* pp. 359–365. IV. The Normal Rôle of Micro-organisms in Larval Growth.—*Ibid.* pp. 367–377. [See also this *Bulletin*, 1932, vol. 29, p. 485.]

subsequent results, which naturally varied with the age and position of the parasite, were at times much more unpleasant, ranging from "sharp itching" and "irritating pricking," to muscular contraction, profuse bleeding, lassitude, "short spells of slight fever," disturbed sleep and "attacks of excruciating pain." Serum, mixed with digested blood and pus, oozed from the warbles, and it was at all times necessary to wear bandages. Those who know the larva of *D. hominis*— a bottle-shaped maggot, surrounded by circlets of chitinous spines, and when adult often measuring practically an inch (25 mm.) in length, by 11 mm. in greatest breadth—will appreciate the author's endurance and pluck.

[Less fortunate than Dunn, BUSCK, who was the first to rear *D. hominis* from his own person, had perforce to accommodate the larvae for 103 days, a remarkable difference in length of development.—*Cf.* BUSCK (A.). On the Rearing of a *Dermatobia hominis* Linnaeus.—*Proc. Ent. Soc. Wash.*, 1912. March. Vol. 14. No. 1. pp. 9–11.]

E. E. A.

DE ALMEIDA (Jayme Lins). Nouveaux agents de transmission de la Berne [*Dermatobia hominis* (L. junior, 1781)] au Brésil. [**New Transmitters of** *Dermatobia hominis*.]—*C. R. Soc. Biol.* 1933. Vol. 113. No. 27. pp. 1274–1275.

In the course of a journey in January 1932 the author found in Juparaña, Rio de Janeiro, a specimen of *Cochliomyia macellaria* bearing on the abdomen 38 eggs of Dermatobia. He states that this is the first record of Cochliomyia acting as a carrier and gives a list of nine others capable of propagating this form of myiasis together with the names of those who made the observations and the dates. These are : *Anthomyia heideni* (Lutz and Aragão, 1917), *A. lindigii* (Lutz, 1917), *Synthesiomyia nudiseta* (Lutz, 1917), *Musca domestica* (Neiva and Fl. Gomes, 1917), *Stomoxys calcitrans* (Neiva and Fl. Gomes, 1917), *Promusca* sp. (Townsend, 1922), *Sarcopromusca arcuata* (Cesar Pinto, 1928), *Neivamyia lutzi* (C. Pinto and Fl. da Fonseca, 1930), *Pselaphephila* sp. (C. Pinto and Fl. da Fonseca, 1930), and now *Cochliomyia macellaria* (J. Lins de Almeida, 1932). *H. H. S.*

CHESNEAU (Pierre) & NGUYEN-DUY-HA. Deux cas de myiase cutanée à *Chrysomia bezzianum*. [**Two Cases of Cutaneous Myiasis caused by** *Chrysomyia bezziana*.]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1933. May. Vol. 11. No. 3. pp. 306–308.

Chrysomyia bezziana, a metallic bluish or greenish fly found in Africa as well as in the East, is a frequent cause of nasal myiasis in India. The cases of myiasis described occurred in Annam, one in a youth with a gunshot wound in the left hip, the other in a woman suffering from confluent smallpox. Both patients were admitted late to hospital, and died in a few days. From the wound 32 larvae, 5 to 10 mm. in length, were removed ; from lesions on the face and on various parts of the body in the second case, nearly 200 similar maggots were extracted. In both instances the species was determined by ROUBAUD. Some of the larvae were bred out, and give rise to flies in from 6 to 11 days. The larval and adult characters of *C. bezziana* are given.

E. E. A.

MACKERRAS (M. J.). **Observations on the Life-Histories, Nutritional Requirements and Fecundity of Blowflies.**—*Bull. Entom. Res.* 1933. Sept. Vol. 24. Pt. 3. pp. 353–362. [25 refs.]

Five species of blow-fly (Calliphorinae) have been bred and their biology studied. The author records a considerable amount of information relating to fecundity, breeding habits, and duration of life under different conditions of temperature. The principal interest of the paper is veterinary, for all the insects investigated are important in relation to the myiasis of sheep in Australia. But the work on the biology of *Lucilia sericata* is of interest to medicine, because the larvae of this insect are now used in the treatment of certain chronic surgical conditions. *P. A. B.*

POTTS (W. H.). **Observations on *Glossina morsitans*, Westw., in East Africa.**—*Bull. Entom. Res.* 1933. July. Vol. 24. Pt. 2. pp. 293–300.

The laboratory observations described, relating mainly to the effect of temperature on the pupal stage, were conducted at Kikori, in Tanganyika Territory; pupae obtained in the laboratory from wild-caught flies were employed, while other series collected from natural breeding-sites were used as controls. In the laboratory larvae were usually deposited late in the afternoon or at night; on sand the newly extruded larva burrowed almost at once, and ceased to move within a quarter of an hour. An account is given of the technique of pupa-production under laboratory conditions, and also of a method of testing viability of pupae by means of immersion in methylated spirit or petrol. It was found that the duration of the pupal stage varied with the temperature, from 23·1 days at a constant 86°F. to 48·5 days when the mean temperature at noon was 70°F. Exposure for half an hour to a temperature of 45°–50°C. (113°–122°F.) was lethal to pupae.

The author uses the terms "puparium" and "pupa" as though synonymous. *E. E. A.*

NASH (T. A. M.). **The Ecology of *Glossina morsitans*, Westw., and Two Possible Methods for its Destruction.—Part. II.**—*Bull. Entom. Res.* 1933. July. Vol. 24. Pt. 2. pp. 163–195. With 2 plates. [40 refs.]

Part I of this paper (see this *Bulletin*, 1933, Vol. 30, pp. 616–617) was devoted to ecology. The concluding portion deals with experiments in the destruction of *G. morsitans* firstly by means of insect parasites (biological control), and later by the aid of two types of traps for pupae. As before, the work was done during four and a half consecutive years, at the Kikori Entomological Station, in Tanganyika.

At Kikori the most important parasites of the pupal stage of *G. morsitans* are three species of *Thyridanthrax* (Diptera), to which belonged as much as 6 per cent. of the emergences from tsetse pupae collected locally during the period mentioned. These flies, however, cannot be bred in captivity, and are therefore useless for biological control. The Hymenopterous parasite *Syntomosphyrum glossinae*, on the other hand, can be bred without difficulty in the laboratory from blowfly pupae, in addition to being extremely prolific and possessing many other useful qualities. By means of an ingenious technique, between December, 1930, and May, 1932, some twenty-three million

S. glossinae were liberated in tsetse breeding-places, but results, unfortunately were disappointing. By July, 1932, probably owing to " the inability of *S. glossinae* to penetrate sandy soils " in order to reach the tsetse pupae, " the parasites had made but little advance towards establishing themselves within the area." The author hopes ultimately to make a further trial " in an area where tsetse breed solely in humus."

In the Kikori fly-belt *G. morsitans* deposits its larvae either beneath outcropping slabs of rock, or under fallen trees. Conspicuous artificial breeding-places made of boards entirely failed to compete with the natural rock sites. Much more promising results were obtained by felling trees to form log traps for pupae, as was done by LAMBORN in Nyasaland, in 1916. Trees selected for this purpose should have straight trunks, with a mean girth of 45 inches ; after felling, branches forming the crown, as also grass beneath the trunk, must be removed, and the underlying earth broken up into a loose bed ; a straight branch, to form a roller, is placed beneath each end of the log and at right angles to it, thus raising it a few inches off the ground and permitting it to be rolled with ease. The attractiveness of such a trap is increased by pegging bark, or placing slabs of rock, at intervals along the sides. The humus formed beneath a decaying tree has no special attraction. Although the natural breeding-sites were not destroyed, the log trap proved " vastly superior " to rock sites, some of which were even deserted in its favour, while log sites frequently yielded fewer pupae than the trap. If paid sixpence a day, four boys in that time can construct eight new log traps at a cost of threepence apiece ; but, by means of a roller placed under each end, a natural log site can be converted into a trap at the cost of one penny.

A temperature of about 112°F. is fatal to *G. morsitans* pupae, all of which, " down to a depth of at least one-and-a-half-inches," can be destroyed during the dry season by exposing breeding-sites to the mid-day sun ; for this purpose traps are rolled every twenty-eight days in the hot-weather, and every forty days while the latter is cooler and the pupal period longer. Although a final test has yet to be made, it is considered that extensive use of log traps in small *G. morsitans* areas may greatly reduce and possibly exterminate the fly. *E. E. A.*

LLOYD (Ll.), LESTER (H. M. O), TAYLOR (A. W.) & THORNEWILL (A. S.). **Experiments in the Control of Tsetse Fly. Part II.**—*Bull. Entom. Res.* 1933. July. Vol. 24. Pt. 2. pp. 233–251. With 2 figs. & 2 maps.

In continuation of previous reports on the work of the Tsetse Investigation in Northern Nigeria (see this *Bulletin*, Vol. 20, p. 794 ; Vol. 21, p. 760 ; Vol. 22, p. 290 ; Vol. 24, p. 891 ; Vol. 26, p. 259 ; Vol. 27, p. 520), an account is given of what was done between May 1926 and the end of October 1929, when field operations were replaced by laboratory research. Work was continued in the Sherifuri experimental area, some " 72 square miles of country, with about 75 miles of meandering watercourses," where the tsetse are *Glossina morsitans* and *G. tachinoides*, and was also carried out in Matyoro, a chain of swamps and lakes in a depression 150 square miles in extent, 110 miles south-east of Sherifuri. In the Matyoro area *G. palpalis* occurs besides the two species already mentioned.

It was endeavoured in both areas " to control tsetse by the destruction of primary and secondary foci by the clearing of all fringing forest,

the general woodland being left untouched." Re-growth after clearing was very active during the first year, but in view of its subsequent diminution re-slashing every third year may suffice. Creepers and grasses, which invade clearings, become so matted as to hinder growth from stumps, and to prevent tsetse from seeing. In the Sherifuri area, after clearings had been made, weekly catches of tsetse in certain foci enabled specific points to be noted. In the case of *G. morsitans*, the wet season extension remained unaffected after the fringing forest had been cleared for 800 yards from the collecting centre, but four miles of similar clearing reduced the extension by five-sixths. *G. tachinoides* was much more severely affected by clearing, and practically failed to spread from a distance of 800 yards and upwards. Fencing half a square mile of country so as to exclude game had practically no adverse effect upon *G. tachinoides*, which is capable of feeding largely upon non-mammalian blood, but the *G. morsitans* caught were immigrants from neighbouring foci, and " were starving inside the fence."

In the Matyoro area, where there is running water throughout the year, the vegetation is subtropical and evergreen, and both *G. tachinoides* and *G. morsitans*, while freely attacking baboons, feed mainly upon the abundant game. Crocodiles and monitor lizards furnish part of the food supply of *G. palpalis*, and also, to a smaller degree, of *G. tachinoides*. In spite of plentiful water, and the " potential " grazing thus afforded, the hordes of tsetse caused the area to be entirely uninhabited. " In order to open up the district for settlement and to make its water supply and grazing accessible to cattle, six and a half miles of the valley have been cleared, the fringing forest and its adjacent heavy woodland savannah both being cut. Groups of settlers have since come in and it is hoped that in time these will be sufficiently numerous to colonise all the available land."

Although four experiments in late grass burning in the Sherifuri area destroyed adults and pupae of *G. morsitans* and *G. tachinoides* in large numbers, it is considered that " the net results do not justify the expense and difficulties which fire protection involves in this country."

E. E. A.

CHORLEY (C. W.). **Traps for Tsetse-Flies of the " Crinoline " and " Ventilator " Forms. With a Prefatory Note by** C. F. M. SWYNNERTON.—*Bull. Entom. Res.* 1933. July. Vol. 24. Pt. 2. pp. 315–318. With 1 text fig. & 1 plate.

The exceedingly cheap and simple traps described and illustrated in this preliminary account have proved effective against *Glossina palpalis*, and their natural attraction is to be enhanced by the addition of a suitable animal scent, if such can be made readily available. Essentially they consist of a " non-return " cage, from which depends a skirt or cylinder of khaki cloth or other fabric, or of cloth-covered or painted wood or tin, kept wide open at the bottom for the admission of inquisitive flies. If appropriately suspended, with its entrance from four inches to a foot from the ground, and fitted with wind-scoops (made from petrol tins), such a trap revolves in the wind, and thus advertises itself.

SWYNNERTON, whose account of some of his own traps for the taking of tsetse-flies was recently noticed [Vol. 30, p. 618], testifies to the worth of Chorley's contrivances in the case of the species mentioned.

E. E. A.

CARMICHAEL (J.). **The Virus of Rinderpest and its Relation to** *Glossina morsitans,* **Westw.**—*Bull. Entom. Res.* 1933. Sept. Vol. 24. Pt. 3. pp. 337–342.

No satisfactory explanation has yet been discovered to account for the remarkable disappearance of *G. morsitans* from the Eastern Transvaal, parts of Rhodesia and elsewhere, following outbreaks of rinderpest commencing with the great epizootic among the wild fauna in 1896. The fact that (in the Transvaal and Rhodesia) although certain kinds of big game, such as the buffalo, suffered what amounted to local extinction, all species were not affected to the same extent, has led to the belief expressed from time to time that the virus of rinderpest, imbibed with blood from diseased animals, may prove as fatal to the fly as to the ungulates themselves. In order to determine the effect of the virus of rinderpest on *G. morsitans*, Carmichael, working in Uganda, has carried out a series of controlled experiments, the results of which failed to furnish " any evidence that rinderpest virus, as it exists in the peripheral blood of infected animals, in any way affects *Glossina morsitans*, either directly or from the point of view of reproduction."

E. E. A.

MELLANBY (Kenneth). **The Influence of Temperature and Humidity on the Pupation of** *Xenopsylla cheopis.*—*Bull. Entom. Res.* 1933. July. Vol. 24. Pt. 2. pp. 197–202. With 2 figs.

The larva of *Xenopsylla cheopis* is easily killed by dry air ; the adult is relatively resistant. This paper describes the effects of temperature and humidity on this flea during the period of metamorphosis. The pupa, like the adult, is resistant to dry air ; the larva and prepupa (pupating larva) are not resistant, and the cocoon is no protection against the dryness. *X. cheopis* can complete its life cycle between 18°C. and 35°C. provided the air is moist ; but at a relative humidity of 40 per cent. the larva dies before pupation can take place.

V. B. Wigglesworth.

PASQUAL (Jas. Hilton). **A Simple Remedy against Jiggers.** [Correspondence.]—*West African Med. Jl.* 1933. July. Vol. 7. No. 1. p. 89.

The author writing from Mamfe, Cameroons, states that a mixture of salicylic acid, 1 part, ichthyol 4 parts, vaseline 4 parts, rubbed over the feet and between the toes not only repels jiggers but expels the newly established flea. It should be re-applied every three days unless removed during the daily bath. It appears that jiggers are very thick in the rest houses of Mamfe. *A. G. B.*

JANISCH (E.). Beobachtungen bei der Aufzucht von Bettwanzen. 1. Ueber das Verhalten von Populationen bei verschiedenen Zuchtbedingungen. [**Studies on the Breeding of Bed-bugs. 1. The Influence of Various Conditions upon Populations.**]—*Ztschr. f. Parasitenk.* 1933. May. Vol. 5. No. 3/4. pp. 460–514. With 23 figs. [15 refs.]

Cultures of bed-bugs (*Cimex lectularius*) were kept under standard conditions of temperature and humidity, fed daily on man or guinea-pig, and bred for many generations. They were kept at 27°, 32° and

34°C., in each case with a relative humidity of 75 per cent. Batches of eggs and larvae were exposed to unfavourable conditions—a temperature of 40°C. for 24 hours—and breeding continued using this stock. Many careful observations are recorded, showing the time required for each stage in the life-history of the bugs. The mortality of all the pre-imaginal stages is recorded, and the length of adult life. Great variations are found in all cases, not only between different cultures, but also within one culture all individuals of which have had similar treatment. This variability makes it difficult to interpret all the results, and some of the author's conclusions require confirmation, particularly those dealing with the effects which injuries of eggs and larvae have on adult longevity and upon egg-production, since only small numbers were used in these experiments. The results appear to show a marked connexion between the treatment of parent bugs and the behaviour of their offspring. If the parents were subjected to unfavourable conditions, not only did they lay fewer eggs, but many of those eggs were sterile, and there was a high pre-imaginal death rate. Under optimum conditions, the time taken by each stage is much more uniform than under less favourable conditions, and the more favourable the conditions during pre-imaginal life, the longer is imaginal life likely to be. This implies that conditions which are not optimal can do some slight damage to the system of the bugs, which is not fatal, but which impairs their vitality permanently. Calculations are made which show the extent of damage mathematically. *K. Mellanby.*

HASE (Albrecht). Zur Fortpflanzungsphysiologie der blutsaugendnr Wanze *Rhodnius pictipes* (Hemipt. Heteropt.). Beiträge euz experimentellen Parasitologie. 9. [**Physiology of Reproduction of** *Rhodnius pictipes*.]—*Ztschr. f. Parasitenk.* 1933. Sept. 6. Vol. 6. No. 1. pp. 129–144. With 5 text figs.

The author has collected in South America and has a knowledge of *Rhodnius pictipes* both in nature and in the laboratory. He points out the great contrast that there is in its behaviour. In its own country it flies and runs with great rapidity, entering houses and biting man, but in captivity it is always most sluggish. The paper describes methods of rearing this insect and gives a considerable body of fact relating to the number of eggs that are laid and to the period passed in the egg at different temperatures. If a group of eggs is kept under identical conditions of temperature and humidity, the hatching is often spread over many days. The author finds that several causes combine to produce mortality in the egg stage, and that the effect on them is different at different temperatures. [It is curious that biologists very seldom pay heed to the causes of death and the times in the life cycle at which mortality occurs.] In general the biology of this insect resembles that of *R. prolixus*. *P. A. B.*

JELLISON (Wm. L.) & PHILIP (C. B.). **Technique for Routine and Experimental Feeding of Certain Ixodid Ticks on Guinea Pigs and Rabbits.**—*Public Health Rep.* 1933. Sept. 1. Vol. 48. No. 35. pp. 1081–1082. With 2 plates.

In this method the ticks are held to the surface of the animal in tin capsules made from the threaded end rings and covers used on cardboard postal tubes. These parts can be obtained, from the makers,

separate from the tubes. The end ring is inserted in a hole in a band of adhesive strapping and held in place by cutting the lower margin to form a flange, which is then covered by another strip of plaster with a hole in it. The animal is clipped, and the band of strapping fastened round it. The ticks are placed in the capsule and retained by screwing on the lid. Ventilation may be provided by punching a hole in the screw top and soldering in a piece of wire gauze.

V. B. Wigglesworth.

DUNN (Lawrence H.). **Observations on the Host Selection of** *Ornithodorus talaje* **Guern., in Panama.**—*Amer. Jl. Trop. Med.* 1933. Sept. Vol. 13. No. 5. pp. 475–483.

It has been shown previously that *Ornithodorus talaje* takes the blood of man and rat ; that it is partly responsible for the transmission of human relapsing fever in Tropical America ; and that the causal organism of this disease can be found in the blood of many animals in Panama.

The author shows that this tick is not a common parasite of man in Panama and that when it occurs in houses, it is generally parasitic on rats. On those animals the larvae of this tick can frequently be found, and he has also found them on dogs, cats and chickens. An extensive investigation of wild monkeys of many sorts showed that larvae were very seldom found upon them. In contrast to these findings, *Ornithodorus venezuelensis*, which has frequently been confused with *talaje*, is a normal parasite of human beings. *P. A. B.*

MURASHIMA (Tetsuo). **Prevalence of House Ticks in Kanagawa Prefecture and their Destruction.**—*Jl. Public Health Assoc. Japan.* 1933. Aug. Vol. 9. No. 8. pp. 1–4.

The mite *Liponyssus nagayoi* is believed by the author to have been introduced into Japan by ships from foreign ports, either in cargoes or on rats, and in March, 1926, a passenger steamer, plying between Manila and Yokohama was found to be extensively infested. On arrival at Yokohama, disinfestation was successfully performed by fumigation with chloropicrin. In Japan itself the mite was first discovered in Yokohama in May of the same year, and by 1931–32 practically all parts of the city had become infested ; after Yokohama, the mite is most prevalent in the neighbouring cities of Yokosuka and Kawasaki. *L. nagayoi*, which seems always to be associated with rats, breeds in damp, ill-lighted and badly ventilated places in houses, its numbers increasing as the weather grows warmer. It chiefly attacks the lower abdomen and thighs, and severe cases result in local oedema and itching, followed by scratching on the part of the victims and the formation of scabs. Women apparently are more commonly attacked than men. Measures against *L. nagayoi* include the destruction of rats and their nests, and the use of either crude cresol, carbon tetrachloride or paradichlorobenzene, mixed in each case with gasoline. Fumigation with chloropicrin is impracticable in Japanese houses.

[According to FINNEGAN, there is reason to think that *L. nagayoi* Yamada, is identical with *L. bacoti* Hirst, a species which, originally found in Egypt, has since become widely distributed and, besides occurring in China and America, has been met with on several occasions in London.] *E. E. A.*

INGRAM (W. Wilson) & MUSGRAVE (Anthony). **Spider Bite (Arachnidism): a Survey of its Occurrence in Australia, with Case Histories.**—*Med. Jl. Australia.* 1933. July 1. 20th Year. Vol. 2. No. 1. pp. 10–15. With 4 figs. (3 coloured on 1 plate). [52 refs.]

Spider bite has been responsible for seven recorded deaths in New South Wales during the past five years. Three species of spider are known to be harmful to man in Australia: the "funnel web" spiders, *Atrax robustus* and *A. formidabilis* which belong to the Mygalomorphae and spin funnel-shaped retreats but do not construct snares; and the "red back," *Lathrodectus hasseltii*, which belongs to the typical snare-making spiders, the Arachnomorphae. Descriptions and coloured illustrations of these Arthropods are given, their habits are described, and a number of cases recorded in full to show the characteristic effects of their bites. The bites of *Atrax* appear to be the more serious. Neither the pain nor the local symptoms are usually great, but neurotoxic symptoms of all kinds are liable to occur and death very commonly results; all the persons bitten have been desperately ill. The bites are usually contracted out of doors and at night. The bites of *Lathrodectus* are most commonly inflicted on the genitals during the use of outdoor closets. The pain develops slowly but is generally extremely severe. Nervous symptoms are not so marked as with *Atrax* bites, and death is less frequent (6 per cent. of recorded cases in Australia). Treatment with convalescent serum has given promising results; otherwise treatment is symptomatic. Recovery often takes place quite suddenly in patients extremely ill. *V. B. Wigglesworth.*

WALSH (Groesbeck) & MORGAN (William G.). **Arachnidism: Report of a Series of 29 Cases of Poisoning from the Bite of the** *Latrodectus mactans.*—*Amer. Jl. Med. Sci.* 1933. Sept. Vol. 186. No. 3. pp. 413–418.

Poisoning from the bite of *Lathrodectus mactans*, the "black widow" spider, is widely spread throughout the United States. Although it is true that most cases are contracted during the use of outdoor privies, this is not always the case, and where this history is not obtained there is considerable risk that the symptoms may be mistaken for those of an acute intra-abdominal lesion. Cases illustrating this are described. The most valuable point in differential diagnosis of spider bite is the rigidity of other large muscular masses, such as those of the thigh and lumbar region, besides those of the abdomen. *V. B. Wigglesworth.*

MATHIS (C.) & BERLAND (L.). Une araignée domestique africaine; *Plexippus paykulli*, ennemie naturelle des Stegomyia, hôtes des maisons. [**A Domestic African Spider which preys on Aëdes.**]—*C. R. Acad. Sci.* 1933. July 17. Vol. 197. No. 3. pp. 271–272.

Plexippus paykulli, at one time known as *Salticus culicivorus*, is a domestic hunting spider common throughout the tropics. In Dakar it was observed to prey largely upon adults of *Aëdes aegypti* while these are at rest in dark corners, and it is suggested that it may be a factor of some importance in controlling this species in the adult stage.

V. B. Wigglesworth.

PASHA (Djamal Faik Tutunji). **A Spider-Bite Successfully Treated with Antiscorpion Serum.**—*Folia Medicinae Internae Orientalia.* Jerusalem. 1933. May. Vol. 1. No. 2. pp. 233–234.

"A case of a bite by a venomous black spider (called 'Akis' by the natives of Transjordania) which is believed to be always fatal, is reported. Symptomatic treatment was of no benefit and the patient was almost dying. But a superstition amongst the natives that the 'Akis' borrowed its venom from the scorpion, suggested the trial of antiscorpion serum injection. The result was marvellous and the patient had a narrow escape from death." *A. G. B.*

TANON & NEVEU (R.). Sur la présence à Paris de la "Supella supellictium." [**On the Occurrence of** *Supella supellectilium* **in Paris.**]—*Rev. Méd. et Hyg. Trop.* 1933. May–June. Vol. 25. No. 3. pp. 148–150.

Supella supellectilium, a small brownish cockroach of which the name is badly mangled in the French title of this paper, was found in 1933 to have established itself in a centrally heated block of flats in Paris; and the fact that the insects first made their appearance in rooms previously occupied by a family of Syrians is sufficient explanation of the phenomenon. For in this era of rapid transit *S. supellectilium,* which occurs throughout the warmer parts of the world, may easily be transported alive in personal baggage. A mixture of sodium fluoride and pyrethrum powder, which is among the remedies suggested, should have had the desired effect.

The authors are in error in stating that this insect has not hitherto been met with in France; its occurrence at Draguignan is on record, and it has also been discovered on two occasions in England.

E. E. A.

BARRAUD (P. J.). Additional Records of the Distribution of Anopheline Mosquitoes in India (from January 1, 1931 to April 15, 1933).—*Records of the Malaria Survey of India.* 1933. June. Vol. 3. No. 3. pp. 507–525.

DE BENEDETTI (Augusto). Di un metodo per rendere practicamente insommergibili le polveri menstrui per lo spandimento del verde di Parigi. (A Method for making Dust Menstrua Insubmergible for Paris Greening.)—*Riv. di Malariologia.* 1933. Jan.–Feb. Vol. 12. No. 1. pp. 92–97. English summary p. 259.

BISHOPP (F. C.), CORY (E. N.) & STONE (Alan). Preliminary Results of a Mosquito Survey in the Chesapeake Bay Section.—Reprinted from *Proc. Entom. Soc. Washington.* 1933. Jan. Vol. 35. No. 1. 6 pp.

EWING (H. E.). Three New Chigger Mites of the Genus Trombicula from Panama, with a Key to the Known Adults of Trombicula of the New World.—*Proc. U.S. Nat. Museum.* Washington. 1933. Vol. 82. Art. 29. 6 pp. With 3 figs.

HINMAN (E. Harold). Hereditary Transmission of Infections through Arthropods.—*Amer. Jl. Trop. Med.* 1933. July. Vol. 13. No. 4. pp. 415–423. [27 refs.]

LEVER (R. J. A. W.). Status of Economic Entomology in the British Solomon Islands.—*Bull. Entom. Res.* 1933. July. Vol. 24. Pt. 2. pp. 253–256. [10 refs.] Contains a note on malaria and filariasis.

MARTINI (E.). The Hypopygia of Certain Anophelines (Diptera: Culicidae).—Reprinted from *Proc. Entom. Soc. Washington.* 1933. May. Vol. 35. No. 5. pp. 61–67. With 3 figs. [13 refs.]

PALADINO-BLANDINI (A.). Ordinamento e primi risultati della lotta antianofelica generale in Calabria. (Organisation and First Results of the General Campaign for the Destruction of Anopheles in Calabria.)—*Riv. di Malariologia.* 1933. Jan.–Feb. Vol. 12. No. 1. pp. 118–195. With 31 figs. English summary p. 260.

RODRIGUEZ (Josué). Intoxicaciones por el veneno de las arañas.—*Prensa Méd. Argentina.* 1933. July 5. Vol. 20. No. 27. pp. 1490–1496.

URCHS (O.). Anopheles-Brutplätze und Schatten. Bemerkung zu der Arbeit von L. Kalandadse Archiv für Schiffs- und Tropen-Hygiene, Bd. 37, Heft 2, Februar 1933.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1933. Aug. Vol. 37. No. 8. pp. 391–392.

REVIEWS AND NOTICES.

CHRISTOPHERS (S. R.) [Kt., C.I.E., O.B.E., F.R.S., I.M.S. (retd.)]. **The Fauna of British India, including Ceylon and Burma. Diptera. Vol. IV. Family Culicidae. Tribe Anophelini.**—pp. vi+371. With 53 figs. & 3 plates. Published under the Authority of the Secretary of State for India in Council. Edited by Lt.-Col. R. B. S. SEWELL, C.I.E., Sc.D., I.M.S., assisted by F. W. EDWARDS, M.A., Sc.D. 1933. Oct. London: Taylor and Francis, Red Lion Court, Fleet Street.

The distinguished group of malariologists who work in India have made great contributions to our general understanding of *Anopheles*. They have produced comprehensive papers on the structure of eggs and larvae, on the systematics of certain difficult groups, and on the relation between different species as revealed by structures in the hypopygium and pharynx. Work of this nature is associated with the names of Christophers, BARRAUD, PURI, SINTON, COVELL and others. The senior member of the team has now produced a book which gives a careful summary of all that is known about the species of *Anopheles* which occur in India. As is only natural in a volume on "The Fauna of British India," the outlook is in the main morphological rather than biological. One may sum up the book by saying that without question the Indian species of this genus are now much better known than any other group of Indian insects. It might be added that it is unlikely that further work will result in great advances in knowledge, at any rate along anatomical lines.

The introduction is very full and contains much matter of general interest. The author discusses the classification of the insects and shows that the subdivisions of the genus *Anopheles* which were suggested by himself in 1915 and 1924 are supported by more recent work on the structure of the pharynx and the chaetotaxy of the larvae and pupae. It is a matter of some interest that when the external anatomy of adults and early stages have been examined so exhaustively, they should lead to the same general taxonomic conclusions. The author then passes to a discussion of geographical distribution, first in the world, and then in the Oriental region. The boundary between the Oriental and Australasian regions does not coincide with "Wallace's Line" but is considerably further to the east. Within the Indian area, the change in Anopheline fauna from east to west is gradual and is perhaps more due to rainfall than to any other factor. About three-quarters of the total Indian species have a wide Oriental distribution, and none of these extend to the countries to the west of India. But there is also a considerable Mediterranean element in the fauna, particularly in northern and western India. It is a little difficult to grasp the reasons for which some of the species are assigned to certain zoogeographical elements. For instance, *Anopheles stephensi* is regarded as "Indian" and not "Oriental," but it ranges eastwards through the Malay States and the East Indies and westwards to Southern Mesopotamia. But the assignation of species to zoogeographical groups is always a matter of personal opinion. The section which deals with bionomics gives a brief review of breeding places and habits of adult and larva. There is also a single page on "terrain, season, and other influences"; some further information on such matters is given under individual species later in the book. The section includes a tabular statement in which

the different types of breeding place are distinguished and the characteristic species shown under each. It may be hoped that this admirable systematic and morphological book will furnish a base for much accurate work on the seasonal distribution, hibernation and relation to different types of water of the Anopheline fauna.

The author then passes to a discussion of the relation of different species of *Anopheles* to malaria. In his view there are five species which are important wherever they are found : *culicifacies, stephensi, minimus, fluviatilis* and *sundaicus*. Others are important in parts of India, or may occasionally carry malaria. One would welcome rather more detailed information on this subject ; for instance, I believe that large numbers of wild *A. subpictus* have been dissected in different places and at different seasons with negative results. It would surely be of interest to give the figures ; but both in the introduction and in the text which deals with that species, only a general reference to that work is made. The introduction concludes with precise notes on methods of collecting, mounting, dissecting, etc. : the author includes an invaluable list of the equipment which should be taken on a collecting expedition.

The systematic part of the work, which runs from page 95 to 315, deals with 43 species and a number of varieties. The following synonyms, among others, should be noted : for *fuliginosus, annularis* ; for *listoni, fluviatilis* ; for *ludlowi* var. *sundaicus, sundaicus* ; for *rhodesiensis, d'thali* ; for *rossii, subpictus* ; for *sinensis, hyrcanus* var. *nigerrimus*. Keys are given for identifying adults, full-grown larvae and eggs. It is clearly impossible to summarize or discuss systematic work except in a general way, but may we express regret that the author employs so many gradings of less than generic value. He puts all the Indian species in the genus *Anopheles*, which he subdivides into subgenera, groups and series. Some of the names are used in two special senses : for instance, the subgenus *Myzomyia* contains several groups, one of which is also called *Myzomyia*. We cannot believe that so elaborate a machinery is necessary for classifying such a small number of species, for there are but 43 species of Indian *Anopheles* and only about 160 in the world. This military system, with many ranks, is not to be found in any standard work elsewhere in systematic entomology, and your ignorant reviewer finds himself confused by a mass of names. For instance, when he sees a page headed "Group *Paramyzomyia*," it gives him no help and he has to turn back until he chances on the name of some species. But this elaboration in classification is no new thing in Indian malariology, and clearly no protest that is made can be availing.

Everyone who has to deal with *Anopheles* from any part of the Oriental region will be deeply grateful to Sir Rickard Christophers for crowning his labours in India by this comprehensive and invaluable summary. The only criticisms that could be made relate to matters of detail, and India now has a general account of her species of *Anopheles* which is of greater value and produced in a more scholarly way than any other book of a similar nature. *P. A. Buxton.*

KHARTOUM. **The Kitchener School of Medicine. Fourth Report, 1931–1932.**—77 pp. With 5 plates. [No date or place of publication.]

The following are the principal features :—

The objective is to train Sudanese natives to replace doctors, apparently chiefly of Syrian nationality, recruited outside the Sudan. The course is

comparable to that of Great Britain, but is of four years duration only, instead of five. The shortening is accomplished by compressing the time devoted to Anatomy and Physiology into a single year, teaching sufficient only to form a scientific basis for subsequent instruction in purely professional subjects. A further year is spent compulsorily as house-officer at one of the larger hospitals. It is the intention eventually to lengthen the course to five years, to institute post-graduate courses, and to select some experienced and promising graduates to be trained as bacteriologists for routine laboratory duties and possibly for research investigations also.

The standard attained in the final examination closely approaches that of the Conjoint Board of the London Colleges. The assessors at this examination are men of distinction in Egypt and Great Britain and their reports are full and comprehensive.

Great care is taken in the selection of candidates for entry to the school. All come from the Gordon College, and attention is given not only to mental capacity but also to character and personality.

All instruction is carried out by Government officers. Tutors of the Gordon College teach the Preliminary Sciences and members of the Staff of the Khartoum Hospitals and Health Department are responsible for the professional subjects. There is one officer, the Registrar, whose whole time is devoted to the school, teaching Anatomy and Physiology, and undertaking general management and supervision. It is worthy of note that he receives an adequate allowance beyond his pay for services which demand special qualifications, enthusiasm and devotion, an observation which applies also to the allowances which all lecturers receive.

Both as regards capital and recurrent expenditure the school has required no very heavy financial assistance from Government. Most of the money has been derived from grants from charitable funds and subscriptions from commercial companies and private individuals, natives of the Sudan even having contributed generously. This is an example which might commend itself to other countries, though the Sudan has the advantage of such illustrious names as Gordon and Kitchener to attract public interest.

The report shows that the school is an established success and that its products are making good. Many difficulties must have been encountered; one specially stressed is that concerning the teaching of Midwifery, it being customary in the Sudan as in all Mahommedan countries for women to be strictly secluded and in consequence to be reluctant to submit to examination by men. It is most satisfactory to observe that this difficulty is being surmounted.

It is suggested that subsequent reports might assist the uninformed reader to appreciate the aims, methods and results of medical education if a few brief additions were made. Such additions might take the following form :—

(*a*) A short account of the activities of the Khartoum Civil Hospital, indicating the extent and scope of its practice, thus demonstrating its ability to furnish appropriate clinical material.

(*b*) Some idea of the medical organization of the country with the object of showing the rôle the products of the school are intended to play in this organization.

(*c*) Questions set at examinations with selected answers to give some indication of the quality of the English and the standard of knowledge attained.

H. B. Owen.

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